

Virginia Department of Environmental Quality

**Hazardous Waste Management
Post-Closure Care and Site-Wide Corrective
Action Permit**

**Federal-Mogul Products US, LLC
Winchester, Virginia
EPA ID No: VAD003070976**

**December 17, 2018
Expires December 17, 2028**



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

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Hazardous Waste Management Post-Closure Care and Site-Wide Corrective Action Permit

Permittee: Federal-Mogul Products US, LLC - Winchester
2410 Papermill Road
Winchester, Virginia 22601
EPA ID: VAD003070976

Pursuant to Chapter 14, Article 4, Title 10.1, Code of Virginia (1950), as amended, and regulations promulgated thereunder by the Virginia Department of Environmental Quality (DEQ), a Hazardous Waste Management Post-Closure Permit is issued to the Federal-Mogul Products US, LLC (hereinafter referred to as the Permittee), located in Winchester, Virginia to conduct Post-Closure Care of one hazardous waste management unit and Corrective Action (CA), as necessary to protect human health and the environment, for all releases of hazardous waste or hazardous constituents from any solid waste management unit (SWMU) or Area of Concern (AOC). The facility being permitted is located at 2410 Papermill Road in Winchester, Virginia, and has a geographic location at 39° 09'33" North latitude and 78° 10'23" West longitude.

The Permittee shall comply with all terms and conditions set forth in this Permit including Permit Attachments A through H. If the Permit and the Permit Attachments conflict, the wording of the Permit shall prevail. The Permittee shall also comply with all applicable regulations contained in the Virginia Hazardous Waste Management Regulations (VHWMR) as codified in Title 9 of the Virginia Administrative Code, Agency 20, Chapter 60 (9 VAC 20-60) and the *Resource Conservation and Recovery Act* (RCRA) Regulations under in 40 CFR Parts 124, 260, 261, 262, 264, 265, 268, and 270, as adopted by reference in the VHWMR. (For convenience, wherever the RCRA Regulations are adopted by reference and cited in this Permit and the Permit Attachments, the regulatory citations will be only those from 40 CFR).

The Commonwealth of Virginia has received authorization for its hazardous waste program under Section 3006(b) of the RCRA, 42 U.S.C. § 6926(b), to administer and enforce the RCRA under the VHWMR in lieu of the federal hazardous waste management program. Applicable regulations are those under the VHWMR (9 VAC 20-60) and the RCRA which are in effect on the date of final administrative action on this Permit and as well as any self-implementing statutory provisions and related regulations which are automatically applicable to the Permittee's hazardous waste management activities, notwithstanding the conditions of this Permit.

This Permit is based on the administrative record and the assumption that the information submitted by the Permittee and contained in the administrative record is complete and accurate. The Permittee's failure in the application or during the Permit issuance process to fully disclose all relevant facts, or the Permittee's misrepresentation of any relevant facts at any time, shall be grounds for the modification or termination of this Permit pursuant to 40 CFR § 124.5, § 270.41, §270.42, and § 270.43, and shall also be grounds for initiation of an enforcement action. The

Permittee shall inform the Department of any deviations from permit conditions or changes in the information provided in the application. In particular, the Permittee shall inform the Department of any proposed changes that might affect the ability of the Permittee to comply with applicable regulations and/or permit conditions, or which alter any of the conditions of the Permit in any way.

This Permit is effective as of **December 17, 2018**, and shall remain in effect until **December 17, 2028**, unless revoked and reissued in accordance with 40 CFR § 124.5 and § 270.41, or terminated in accordance with 40 CFR § 270.43, or continued in accordance with VHWMR 9 VAC 20-60-270.B.15.

December 17, 2018

Date Signed

Leslie A. Romanchik

Leslie A. Romanchik
Hazardous Waste Program Manager
Office of Financial Responsibility and Waste Programs

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LIST OF ATTACHMENTS

The following Attachments are incorporated, in their entirety, by reference into this Permit. These incorporated attachments are enforceable conditions of this Permit. The Department has, as deemed necessary, modified specific language from the permit application. Additional modifications are prescribed in the **Permit Conditions (Modules I and VI)**, and thereby supersede the language of the Attachments to the extent that there is a direct conflict between the Attachments and Modules I and VI of the Permit.

ATTACHMENT A

Facility Maps And Figures A-1

ATTACHMENT B

Facility Background, Corrective Action, and Environmental History B-1

ATTACHMENT C

*Post-Closure Care Plan: Surface Impoundments 1 and 2 and Wastepile Closed as
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DEFINITIONS

All definitions contained in 40 CFR Sections 124.2, 260.10, 270.2, 264.141, 264.1031, 264.1051, 264.1081, and 9 VAC 20-60 are hereby incorporated, in their entirety, by reference into this Permit. Any of the definitions used below, (a) through (j), shall supersede any definition of the same term given in 40 CFR Sections 124.2, 260.10, 270.2, 264.141, 264.1031, 264.1051, 264.1081, and 9 VAC 20-60. Where terms are not defined in the regulations or the Permit, the meaning associated with such terms shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

Throughout the Permit, all references to 40 CFR parts 261-266, 268, 270, 273, 279, are as adopted by reference in the Virginia Hazardous Waste Management Regulations, 9 VAC 20-60.

- a. The term "**Permit**" shall mean the Permit issued by the Virginia Department of Environmental Quality, pursuant to Chapter 14, Article 4, Title 10.1, Code of Virginia (1950), as amended, and the Virginia Hazardous Waste Management Regulations (VHWMR) as codified in Title 9 of the Virginia Administrative Code, Agency 20, Chapter 60 (9 VAC 20-60).
- b. The term "**Director**" shall mean the Director of the Virginia Department of Environmental Quality or his designated representative.
- c. The term "**Department**" shall mean the Virginia Department of Environmental Quality (DEQ), (with the address as specified in **Permit Condition I.I.2**).
- d. The terms "**facility**" or "**site**" shall mean all contiguous land, and structures, other appurtenances, and improvements on the land, used for treating, storing, or disposing of hazardous waste. For the purpose of implementing corrective action under 40 CFR § 264.101, "facility" means all contiguous property under the control of the owner or operator under a permit under Subtitle C of RCRA.
- e. The term "**hazardous waste management unit**" is a contiguous area of land on or in which hazardous waste is placed, or the largest area in which there is significant likelihood of mixing hazardous waste constituents in the same area. Examples of hazardous waste management units include a surface impoundment, a waste pile, a land treatment area, a landfill cell, an incinerator, a tank and its associated piping and underlying containment system and a container storage area. A container alone does not constitute a unit; the unit includes containers and the land or pad upon which they are placed.
- f. The term "**release**" shall mean any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of any hazardous waste or hazardous constituents.
- g. The term "**Area of Concern**" shall mean an area at the facility or an off-site area, which is not at this time known to be a solid waste management unit, where hazardous waste and/or hazardous constituents are present or are suspected to be present as a result of a release from the facility.
- h. The term "**Hazardous Constituent**" shall mean a constituent that is listed in 40 CFR Part 261, Appendix VIII.
- i. The term "**Permittee**" shall mean the owner/operator of the facility to which the Permit is issued.
- j. The term "**EPA**" shall mean United States Environmental Protection Agency.

- k. The term **“Solid Waste Management Unit”** shall mean any discernable unit at the facility from which hazardous constituents might migrate, irrespective of whether the units were intended for the management of solid and/or hazardous wastes. Such units include any area at a facility which solid wastes have been routinely and systematically released.
- l. The term **“Unit”** refers to containers, container storage areas, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, underground injection wells, and other physical, chemical, and biological units or treatment units.
- m. The term **“Days”** shall mean calendar days except as otherwise provided herein.

MODULE I - STANDARD CONDITIONS

I.A EFFECT OF PERMIT

I.A.1 Permit

This Permit, issued by the Director pursuant to 40 CFR § 270.1(c)(4), authorizes only the management of hazardous waste for post-closure care and corrective action expressly described in this Permit and in accordance with the conditions of this Permit and with the applicable provisions of the VHWMR under 9 VAC 20-60. Any management of hazardous waste by the Permittee which is not authorized by this Permit or 9 VAC 20-60, and for which a permit is required under Chapter 14, Article 4, Title 10.1, Code of Virginia (1950), as amended, is prohibited. (40 CFR § 270.30(g) and 270.4(b) and (c)) Compliance with this Permit generally constitutes compliance, for the purposes of enforcement, with Chapter 14, Article 4, Title 10.1-1426, Code of Virginia (1950), as amended. This Permit does not convey any property rights of any sort, or any exclusive privilege. Possession of a permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of Commonwealth of Virginia or local laws or regulations. Compliance with the terms of this Permit may not constitute a defense to any action brought under Chapter 14, Article 8, Code of Virginia (1950), as amended, or any other Commonwealth law governing protection of the public health or the environment.

I.A.2 CA Obligations

The Permittee is obligated to complete facility-wide CA under the conditions of a RCRA Permit regardless of the operational status of the facility. The Permittee must submit an application for a new Permit at least 180-days before this Permit expires pursuant to 40 CFR § 270.10(h), unless the Permit has been modified to terminate the CA schedule of compliance and the Permittee has been released from the requirements for financial assurance for corrective action.

I.B PERMIT ACTIONS

This Permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR § 124.5, 270.30(f), 270.41, 270.42, and 270.43. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination, or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay the applicability or enforceability of any permit condition (40 CFR § 270.30(f)).

I.B.1 Permit Modifications

Permit modifications at the request of the Permittee shall be done as specified by 40 CFR § 270.42.

I.B.2 Renewal

This Permit may be renewed as specified in 9 VAC 20-60-270.B.6 and 40 CFR § 270.10(h), and **Permit Condition I.D.2**. Review of any application for a permit renewal shall consider improvements in the state of control and measurement technology, as well as changes in applicable regulations.

I.C SEVERABILITY

I.C.1 Provisions

The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Permit shall not be affected thereby. Invalidation of any Commonwealth or federal statutory or regulatory provision which forms the basis for any condition of this Permit does not affect the validity of any other Commonwealth or Federal statutory or regulatory basis for said condition. (40 CFR § 124.16(a)(2)).

I.C.2 Permit is Stayed

To the extent conditions of any new permit are stayed under this condition, the Permittee shall comply with the conditions of the existing permit which correspond to the stayed conditions, unless compliance with the existing conditions would be technologically incompatible with compliance with other conditions of the new Permit which have not been stayed.

I.D DUTIES AND REQUIREMENTS

I.D.1 Duty to Comply

The Permittee shall comply with all conditions of this Permit, except that the Permittee need not comply with the conditions of this Permit to the extent and for the duration such noncompliance is authorized by an emergency permit under 40 CFR § 270.61. Any other noncompliance with the Permit constitutes a violation of Title 10.1 Code of Virginia (1950), as amended, and regulations promulgated thereunder is grounds for enforcement action, permit termination, revocation and reissuance, modification, or denial of a permit renewal application. (40 CFR § 270.30(a))

I.D.2 Duty to Reapply

If the Permittee wishes to or is required to continue an activity regulated by this Permit after the expiration date of this Permit, the Permittee shall apply for and obtain a new permit as specified below.

- a. The Permittee shall submit a new and complete permit application for a new permit at least 180 days before the Permit expires, unless a later date has been approved by the Director (40 CFR § 270.30(b)).

- b. Pursuant to 40 CFR § 270.10(h), the Director shall not grant permission for an application to be submitted later than the expiration date of the existing Permit.

I.D.3 Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittee in an enforcement action to argue that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit (40 CFR § 270.30(c)).

I.D.4 Duty to Mitigate

In the event of noncompliance with the Permit, the Permittee shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment (40 CFR § 270.30(d)).

I.D.5 Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Permit (40 CFR § 270.30(e)).

I.D.6 Duty to Provide Information

The Permittee shall furnish to the Director within a reasonable time, any pertinent information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit, or to determine compliance with this Permit. The Permittee shall also furnish to the Director, upon request, copies of records required to be kept by this Permit (40 CFR § 270.30(h)).

I.D.7 Inspection and Entry

The Permittee shall allow the Director or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:

- a. Enter at reasonable times upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under conditions of this Permit;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and
- d. Sample or monitor at reasonable times for the purposes of assuring Permit compliance or as otherwise authorized by the VHWMR, any substances or parameters at any location (40 CFR § 270.30(i)).

I.D.8 Reporting Planned Changes

The Permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility, which will or has the potential to affect the regulated unit or the associated groundwater monitoring system (40 CFR § 270.30(1)(1)). This notice shall include a description of all incidents of noncompliance reasonably expected to result from the proposed changes.

I.D.9 Anticipated Noncompliance

The Permittee shall give advance written notice to the Director of any planned changes in the permitted facility or activity that may result in noncompliance with Permit requirements (40 CFR § 270.30(1)(2)).

I.D.10 Twenty-four Hour Reporting

The Permittee shall report to the Director any noncompliance which may endanger human health or the environment. Information shall be provided orally within twenty- four (24) hours from the time the Permittee becomes aware of the circumstances. The information specified (a, b, and c) shall be reported orally within 24 hours:

- a. Information concerning the release of any hazardous waste that may cause an endangerment to public drinking water supplies.
- b. Any information of a release or discharge of hazardous waste or of a fire or explosion from the Hazardous Waste Management (HWM) facility which could threaten the environment or human health outside of the facility.
- c. The description of the occurrence and its cause shall include at least the following:
 - i Name, address, and telephone number of the owner or operator;
 - ii Name, address, and telephone number of the facility;
 - iii Date, time, and type of incident;
 - iv Name and quantities of material(s) involved;
 - v The extent of injuries, if any;
 - vi An assessment of actual or potential hazard to the environment and human health outside the facility, where this is applicable; and
 - vii Estimated quantity and disposition of recovered material that resulted from the incident (40 CFR § 270.30(1)(6)).
- d. A written submission shall also be provided to the Director within five (5) days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the periods of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated duration of noncompliance; the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The Director may waive the 5-day notice requirement in favor of a written report within fifteen (15) days (40 CFR § 270.30(1)(6)(iii)).

I.D.11 Other Noncompliance

The Permittee shall report all other instances of noncompliance not otherwise required to be reported above, at the time monitoring reports are submitted. The reports shall contain the information listed in **Permit Condition I.D.10** (40 CFR § 270.30(l)(10)).

I.D.12 Other Information

Whenever the Permittee becomes aware that it failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the Permittee shall promptly submit such facts or information to the Director (40 CFR § 270.30(l)(11)).

I.E MONITORING AND RECORDS

I.E.1 Monitoring Reports

Monitoring shall be performed and results shall be reported at the intervals specified in the Permit.

I.E.2 Samples and Measurements

Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity (40 CFR § 270.30 (j)(1)). The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method specified in 40 CFR § 261, Appendix I, or an equivalent method approved by the EPA. Laboratory methods must be those specified in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846 (3rd ed.; November, 1986, as updated), and Standard Methods of Wastewater Analysis (16th ed.; 1985, as updated), or an equivalent method approved by the EPA. Additionally, the laboratory must be accredited for the analytical method, matrix and target analyte (where applicable) by the Virginia Environmental Laboratory Accreditation Program (VELAP).

I.E.3 Records of All Monitoring Information

The Permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this Permit, all certifications required by 40 CFR § 264.73(b)(9), and records of all data used to complete the application for this Permit, for a period of at least 3 years (or longer if specified elsewhere in this Permit) from the date of the sample collection, measurement, report, certification, or application. These retention periods may be extended by the request of the Director at any time and are automatically extended during the course of any unresolved enforcement actions regarding this facility. The Permittee shall maintain records from all ground-water monitoring wells and associated ground-water surface elevations, for the active life of the facility, and for disposal facilities for the post-closure care period as well.

- a. Records of monitoring information shall include at a minimum:
- b. The date, exact place, and time of sampling or measurements;
- c. The individual(s) who performed the sampling or measurements;
- d. The date(s) analyses were performed;
- e. The individual(s) who performed the analyses;
- f. The analytical techniques or test methods used; and

- g. The results of such analyses. (40 CFR § 270.30(j))

I.F COMPLIANCE NOT CONSTITUTING DEFENSE

Compliance with the terms of this Permit does not constitute a defense to any action brought under Chapter 14, Article 8 of Title 10.1, Code of Virginia (1950) as amended or any other Commonwealth law governing protection of the public or the environment

I.G TRANSFER OF PERMITS

This Permit is not transferable to any person except after notice to the Director (40 CFR § 270.30(l)(3)). The Director may require modification or revocation and reissuance pursuant to 40 CFR § 124.5, 270.40, 270.41, 270.42, and 270.43 to change the name of the Permittee and incorporate such other requirements as may be necessary. Before transferring ownership or operation of the facility during its operation life, or of a disposal facility during post-closure care period, the Permittee shall notify the new owner or operator in writing of the requirements of 9 VAC 20-60-264 and 40 CFR § 264 and 270 (40 CFR § 264.12(c)). The Permittee shall send a copy of such notice to the Director (40 CFR § 270.40).

I.H PERMIT EXPIRATION AND CONTINUATION

Pursuant to 9 VAC 20-60-270.B.15., this Permit will remain in force until the effective date of a new permit if the Permittee has submitted a timely, complete application pursuant to **Permit Condition I.D.2.**, and through no fault of the Permittee, the Director has not issued a new permit with an effective date on or before the expiration date of this Permit. All conditions of the continued Permit shall remain fully effective and enforceable (40 CFR § 270.51).

I.I REPORTS, NOTIFICATIONS, AND SUBMISSIONS TO THE DEPARTMENT

The Virginia Department of Environmental Quality (DEQ) will review the plans, reports, schedules and other documents (hereinafter collectively referred to as "submission") submitted which require Department approval. The Department will notify the Permittee in writing of Department's approval or disapproval of each submission.

I.I.1 Annual Report

The Permittee shall submit an annual groundwater monitoring report no later than March 1st of each calendar year containing, at a minimum, groundwater monitoring results for each monitoring event including applicable summary tables and figures as stated in **Permit Attachment E**.

I.I.2 Duty to Submit Certified Documents

All work plans, reports, notifications or other submissions which are required by this Permit to be sent or given to the Director shall be sent electronically, postal mailing or hand-delivered to:

For Corrective Action and Groundwater:

Department of Environmental Quality
Groundwater/Corrective Action Program Team Leader

Office of Remediation Programs
PO Box 1105
Richmond, Virginia 23218

For Permit Modifications:

Department of Environmental Quality
Hazardous Waste Program Manager
Office of Financial Responsibility and Waste Programs
PO Box 1105
Richmond, Virginia 23218

Street Address:

1111 East Main Street, Suite 1400
Richmond, Virginia 23219

And one (1) copy of all such correspondence, reports, and submissions shall also be sent electronically to:

Land Program Manager, Valley Regional Office

Department of Environmental Quality
P.O. Box 3000
Harrisonburg, Virginia 22801

Associate Director, Office of Remediation

Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, PA 19103-2029
Mail Code: (3LC20)

I.I.3 **Signatory Requirements**

All applications, work plans, reports, and other information submitted shall be signed and certified as specified by 40 CFR § 270.11.

I.J **DOCUMENTS TO BE MAINTAINED AT THE FACILITY SITE**

I.J.1 **Documents**

Current copies of the following documents, as amended, revised, and modified, shall be maintained at the facility. These documents shall be maintained until post-closure care and corrective action are completed and certified by the Permittee and by an independent, Virginia-registered professional engineer, unless a lesser time is specified in the Permit.

- a. The Permit, including all attachments, revisions and modifications;
- b. All Part A and B Permit Applications supporting the Permit;
- c. The facility operating record required by 40 CFR § 264.73, to the extent applicable;
- d. Inspection schedules and logs required by 40 CFR § 264.15(b)(2) and § 264.15(d), as applicable;

- e. Personnel training documents and records required by 40 CFR § 264.16 and this Permit, as applicable;
- f. Closure Plans, as required by 40 CFR § 264.112(a), as applicable;
- g. Post-Closure Plans, as required by 40 CFR § 264.118(a), as applicable;
- h. Groundwater sampling and analysis plans for remedial effectiveness and long term groundwater monitoring required by this Permit, including groundwater monitoring results;
- i. Operations and maintenance plan required by this Permit;
- j. Corrective Action work plans, reports, and other information and submissions regarding Corrective Action, as applicable under this Permit; And
- k. All other documents required by **Permit Conditions I.D.8** through **I.D.12** and **I.E.**

I.K APPROVAL/DISAPPROVAL OF SUBMISSIONS

I.K.1 Review

The Department will review the plans, reports, schedules and other documents (hereinafter collectively referred to as "submission") submitted which require the Department's approval. The Department will notify the Permittee in writing of the Department's approval, conditional approval, or disapproval of each submission.

I.K.2 Approval

Each submission required by this Permit, upon approval by the Director, is incorporated into this Permit. Any noncompliance with a Department-approved submission shall be deemed as noncompliance with this Permit. A conditionally approved submission, including any terms of such conditional approval set forth in Department's decision, shall constitute the Department-approved submission and shall be incorporated into this Permit.

I.K.3 Conditional Approval

In the event of the Department's conditional approval of submission, the Department shall specify in writing any deficiencies in the submission and the terms upon which approval of the submission is conditioned. If the Permittee disputes any term upon which approval of the submission was conditioned, the Permittee may initiate Dispute Resolution pursuant to **Permit Condition I.L.**

I.K.4 Disapproval

In the event of the Department's disapproval of a submission, the Department shall specify the deficiencies in writing. The Permittee shall address the specified deficiencies within a reasonable time period established by the Department taking into account the tasks to be performed, and submit the revised submission, as necessary, to the Department for approval.

I.K.5 Revision Disapproval

If the revised submission is disapproved, the Department will notify the Permittee of the deficiencies in writing and specify a schedule for the Permittee to correct the deficiencies and resubmit the submission to the Department. The Permittee shall correct the

deficiencies as directed by the Department, and forward the revised submission within the time period specified by the Department. In the event the Permittee disagrees with the Department's disapproval of the revised submission, the Permittee shall notify the Department in writing and the disagreement shall be resolved in accordance with the Dispute Resolution provision in **Permit Condition I.L.** of this Permit.

I.L DISPUTE RESOLUTION

I.L.1 Disagreement with Department's Determination

Except as otherwise provided in this Permit, in the event the Permittee disagrees, in whole or in part, with Department disapproval of any submission required by this Permit, the Permittee shall notify the Department in writing of its objections, and the basis thereof, within fourteen (14) days of receipt of the Department's disapproval. Such notice shall set forth the specific matters in dispute, the position(s) the Permittee asserts which should be adopted as consistent with the requirements of the Permit, the basis for the Permittee's position, and supporting documentation considered necessary for the Department's determination.

I.L.2 Resolution

The Department and the Permittee shall have an additional fourteen (14) days from the Department's receipt of the notification to meet or confer to resolve any disagreement/dispute. In the event agreement is reached, the Permittee shall submit the revised submission and implement the same in accordance with such agreement.

I.L.3 Agreement Not Met

In the event the Permittee and the Department are not able to reach an agreement on the dispute items within the additional 14-day period, the Department will notify the Permittee in writing of its decision on the dispute and the Permittee shall comply with the terms and conditions of the Department's decision in the dispute. The Permittee does not waive its right to assert any and all available defenses in a proceeding to enforce this Permit.

I.L.4 Appeal

In the event the Permittee disagrees with Department 's disapproval of a submission or revised submission and the Department's written decision regarding dispute items, the Permittee may file an appeal with the Director within 30 days of the disapproval (as provided for in Rule 2A:2 of the Supreme Court of Virginia).

MODULE II - GENERAL FACILITY CONDITIONS

II.A DESIGN AND OPERATION OF FACILITY

The Permittee shall, maintain and operate the Federal-Mogul Products US, LLC facility to minimize the possibility of a fire, explosion, or any unplanned, sudden or non-sudden release of hazardous waste constituents to air, soil, groundwater or surface water which could threaten human health or the environment, as required by 40 CFR § 264.31.

II.B GENERAL WASTE ANALYSIS

A list of hazardous wastes known to have been placed in the waste management units is provided in **Permit Attachment C**. This list is based upon information provided by the facility.

II.C SECURITY

The Permittee shall comply with the security provisions of 40 CFR § 264.14. The security provisions shall follow the requirements described in the Permit.

II.D GENERAL INSPECTION REQUIREMENTS

The Permittee shall follow a written inspection schedule observing malfunction, deterioration, or operational errors in the monitoring systems for the waste management units (40 CFR § 264.15).

II.D.1 Inspection Logs

Inspection logs will be maintained for at least three years from the date on which the inspection was completed. Permittee shall implement remedial action when necessary; and maintain a signed and dated inspection log at the facility and available to the Department upon request 40 CFR § 264.15(d). The inspection logs provide inspection observations, deficiencies noted, and corrective action taken. The Permittee shall follow the frequency of inspections as specified in the Permit.

II.E PERSONNEL TRAINING

The Permittee shall conduct required personnel training (40 CFR § 264.16). The training program shall follow Permit Attachment D and as described in the Permit. The Permittee shall maintain training documents and records (40 CFR § 264.16(e)).

II.E.1 Required Training

All personnel required under this Permit to receive training shall at minimum be instructed in the following areas:

- a. Area specific management practices regarding post-closure care and corrective action activities.
- b. Security and safety.
- c. General and area specific inspections and record keeping.
- d. Regulatory updates which affect operations and activities.

- e. Job function and procedural descriptions of each employee's respective role in post-closure care and/or corrective action.

II.F RECORDKEEPING AND REPORTING

II.F.1 Operating Record

The Permittee shall maintain a written operating record at the facility in accordance with 40 CFR § 264.73. The record can be a compilation of various documents and shall include, but not be limited to, the information listed below.

The following records shall be maintained until post-closure and corrective actions are complete and certified:

- a. Records of spills and releases required by existing environmental laws, including, but not limited to §103 of the Comprehensive Environmental Response, Compensation and Liability Act;
- b. Written reports and records of verbal notification to the Director to address releases, fires, and explosions;
- c. All reports of noncompliance pursuant to **Permit Condition I.D.9**;
- d. All submittals prepared pursuant to **Permit Condition I.D.10**;
- e. Records of all monitoring information pursuant to **Permit Condition I.E**; and;
- f. Training records of current facility personnel.
- g. Records shall be maintained for a minimum of 3 years. This time period may be extended by the Department in the event of enforcement action or notification by the Department that an investigation is ongoing.
- h. Current copies of the following documents as amended, revised, and modified shall be maintained at the facility until post-closure and corrective action is complete and certified:
 - i. Generator Biennial Reports submitted in compliance with 40 CFR § 262.41;
 - j. Facility Annual Reports submitted in compliance with 40 CFR § 264.75;
 - k. Training records of former facility personnel; and
 - l. Records of all inspections, pursuant to 40 CFR § 264.15, which shall include at a minimum:
 - i The date and time of the inspection;
 - ii The name of the person performing the inspection;
 - iii A notation of the observations made; and
 - iv The date and nature of any repairs or remedial actions.
- m. Training Plan; and
- n. All closure, post-closure, interim measures, and final corrective action cost estimates; financial assurance documents prepared pursuant to this Permit; and the company names and addresses of facility insurers.

II.F.2 Required Reports

The Permittee shall comply with all applicable reporting requirements as described in **Permit Conditions I.D and I.I.**

II.G COST ESTIMATE FOR FACILITY POST-CLOSURE

II.G.1 Annual Adjustment

The Permittee must adjust the post-closure care cost estimate for inflation sixty (60) days prior to the anniversary of the date on which the first cost estimate was prepared as required by 40 CFR § 264.144(b).

II.G.2 Adjustment for Changed Conditions

The Permittee must revise the post-closure cost estimates whenever there is a change in the facility's post-closure plans as required by 40 CFR § 264.144(c).

II.G.3 Availability

The Permittee must keep at the facility the latest post-closure cost estimates as required by 40 CFR § 264.144(d).

II.G.4 Incapacity of Owner/Operator, Guarantors, or Financial Institutions

The Permittee shall comply with 40 CFR § 264.148 whenever necessary.

MODULE III - POST-CLOSURE CARE

III.A HIGHLIGHTS

Federal-Mogul Products US, LLC owns and maintains the facility at 2410 Papermill Road in Winchester, Virginia. Through several changes in ownership, the plant's principle products have been brake linings and disc pads for the heavy truck/automobile industry since production started in 1948. The facility ceased operation on March 28, 2013.

Abex Corporation, the previous owner, utilized both surface impoundments and waste piles for management of hazardous wastes (EPA waste code D008 for Lead) generated at the Winchester, Virginia facility.

The Department has determined that Federal-Mogul's waste pile and surface impoundments closed as hazardous waste landfills have affected the groundwater quality in the beneath the RCRA units. The units identified in the Permit are monitored as one hazardous waste management area under the compliance monitoring program.

III.B UNITS IDENTIFIED FOR POST-CLOSURE CARE

The Permittee shall provide post-closure care for the following identified hazardous waste management units, subject to the terms and conditions of this Permit.

III.B.1 Units Closed as Hazardous Waste Landfill

At final closure of a hazardous waste landfill the owner or operator must cover the landfill with final cover designed and constructed pursuant to 40 CFR § 264.310.

III.B.2 Waste Pile

The former waste pile contained dredged solids from Impoundment #1 that were stored onsite. The waste pile was capped and closed as a hazardous waste landfill based on the concentrations of lead.

- a. Final Cover - A three (3) foot clay cap and six (6) inches of topsoil was placed over the entire waste pile area. The final cover schematic is included in the Post-Closure Plan, **Permit Attachment C**.
- b. List of Wastes - The wastes involved have been identified in the List of Wastes, **Permit Attachment C**.
- c. Liner System Description - The hazardous waste landfill does not have a liner system.
- d. Leachate Detection/Collection System - The hazardous waste landfill does not have a leachate detection/collection system.

III.B.3 Surface Impoundments

The former Surface Impoundments #1 and #2, received solids captured in air pollution control equipment. Hazardous waste containing lead was generated and managed in the surface impoundments. . Surface Impoundments #3 and #4 were "clean" closed with respect to soils, but were not "clean" closed with respect to groundwater. Surface

Impoundments #1 and #2 have been closed as a hazardous waste landfill and was certified on February 11, 1991.

- a. Final Cover - The final cover installed over the impoundment area consisted of a two (2) foot layer of compacted clay (with a maximum remolded permeability of 1×10^{-7} cm/sec), a one foot drainage layer (gravel or equivalent with permeability of 1×10^{-3} cm/sec), a filter fabric layer, and a two (2) foot vegetative layer. The final cover schematic is included in the Post-Closure Plan, **Permit Attachment C**.
- b. List of Wastes - The wastes involved have been identified in the List of Wastes, **Permit Attachment C**.
- c. Liner System Description - The hazardous waste landfill does not have a liner system.
- d. Leachate Detection/Collection System - The hazardous waste landfill does not have a leachate detection/collection system.

III.C POST-CLOSURE CARE AND USE OF PROPERTY

The Permittee shall conduct post-closure care for the hazardous waste management units listed in **Permit Condition III.B**, for a period of thirty (30) years after final closure certification, February 11, 2021 (40 CFR § 264.117(a)(1)).

III.C.1 Reduction

The Permittee may request a reduction in the 30-year post-closure period if the following conditions exist (40 CFR § 264.117(a)(2)(i)):

- a. All land-disposal units have been closed.
- b. A shortened period is sufficient to protect human health and the environment based upon: leachate or groundwater monitoring results, characteristics of the hazardous wastes, application of advanced technology, or alternate disposal, treatment, or reuse techniques indicate that the facility is secure.

III.C.2 Extension

The Director may extend the post-closure period applicable to the hazardous waste management unit or facility if the extended period is necessary to protect human health and the environment (e.g., leachate or groundwater monitoring results indicate a potential for migration of constituents at levels which may be harmful to human health and the environment) (40 CFR § 264.117(a)(2)(ii)).

III.C.3 Use of Post-Closure Units

The Permittee shall not allow any use of the units designated in **Permit Condition III.B**, which would disturb the function of the facility's monitoring systems during the post-closure care period in accordance with 40 CFR § 264.117(c).

III.D POST-CLOSURE REQUIREMENTS FOR REGULATED UNITS

III.D.1 Post-Closure Plan

The Permittee shall implement the Post-Closure Plan in accordance with **Permit Attachment C**. All post-closure care activities must be conducted in accordance with the provisions of the Post-Closure Plan, 40 CFR § 264.117(d), and 40 CFR § 264.118(b).

III.D.2 Groundwater Monitoring Requirements

The Permittee shall maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of 40 CFR § 264.90 during the post-closure care period in accordance with 40 CFR § 264.117(a).

III.E INSPECTIONS

The Permittee shall inspect the components, structures, and equipment at the site in accordance with the Inspection Requirements as stated in the Permit and **Permit Attachment C** (40 CFR § 264.117(a)(1)(ii)).

III.F POST-CLOSURE SECURITY

The Permittee shall maintain security at the facility during the post-closure care period, in accordance with the Post-Closure Plan, **Permit Attachment C**, and 40 CFR § 264.117(b).

III.G FINANCIAL ASSURANCE FOR FACILITY POST-CLOSURE

The Permittee shall maintain compliance with 40 CFR § 264.144 by providing financial assurance, as required by 40 CFR § 264.145, in at least the amount of the cost estimates required by **Permit Condition II.G**. Changes in financial assurance mechanisms must be approved by the Director.

III.H COMPLIANCE PERIOD

The Compliance Period is the period of time that the facility is required to remain in compliance with the Groundwater Protection Standards (GPS) in the uppermost aquifer beneath the unit at the point of compliance (40 CFR § 264.92 and 264.96). The compliance period is the number of years equal to the active life of the Regulated Unit including the closure period. The compliance period begins when the Permittee initiates a compliance monitoring program.

III.H.1 Conclusion of Compliance Period

If at the end of the specified compliance period, the facility is engaged in a corrective action program, the compliance period shall be extended until the Permittee can demonstrate that the GPS has not been exceeded at the point of compliance for a period of three (3) consecutive years (40 CFR § 264.96(c)).

III.H.2 Certification of Completion of Post-Closure Care

No later than sixty (60) days after completion of the established post-closure care period for each hazardous waste management unit(s), the Permittee shall submit to the Director, a certification that the post-closure care period for the hazardous waste management unit(s) was performed in accordance with the specifications in the approved Post-Closure Plan. The certification must be signed by the Permittee and an independent, licensed,

registered, Virginia certified professional engineer. Documentation supporting the professional engineer's certification must be furnished to the Director upon request.

III.H.3 Post-Closure Modifications

If the Permittee or any subsequent owner or operator of the land upon which the closed units are located wishes to remove hazardous wastes and hazardous waste residues, or contaminated soils, then they shall request modification to this Post-Closure Permit in accordance with the applicable requirements in 40 CFR § 264.119(c) and 9VAC 20-60-270. The Permittee or any subsequent owner or operator of the land shall demonstrate that the removal of hazardous wastes will satisfy the criteria of 40 CFR § 264.117(c).

MODULE IV - DETECTION MONITORING

IV.A HIGHLIGHTS

Abex Friction Products (prior to purchase by Federal-Mogul) implemented an interim status groundwater monitoring program in January 1983, which was designed to determine the impact on groundwater quality in the uppermost aquifer beneath the waste pile closed as a hazardous waste landfill. An assessment monitoring program was implemented in 1986 and the units were determined to be affecting groundwater.

Surface Impoundments #1 and #2 were closed as a hazardous waste landfill. Surface Impoundments #3 and #4 were "clean" closed with respect to soils, but did not "clean" close with respect to groundwater. The above units were monitored as one hazardous waste management unit under the compliance monitoring program.

The facility presently detects hazardous constituents above background concentrations in the groundwater but below the groundwater protection standards (GPS) and conducts Compliance Monitoring in accordance with the requirements of 40 CFR § 264.99.

MODULE V - GROUNDWATER COMPLIANCE MONITORING

V.A HIGHLIGHTS

The Department has determined that Federal-Mogul's waste pile and surface impoundments closed as hazardous waste landfills have affected the groundwater quality beneath the RCRA units.

V.B FACILITY BACKGROUND

An interim status groundwater monitoring program was initiated in January 1983, which was designed to determine the impact on groundwater quality in the uppermost aquifer beneath the waste pile closed as a hazardous waste landfill. Impoundments #1 and #2 are closed as a hazardous waste landfill. Surface Impoundment's #3 and #4 were "clean" closed with respect to soils, but did not "clean" close with respect to groundwater. Impoundment #3 and #4 are monitored as one hazardous waste management unit under the compliance monitoring program.

The horizontal extent of groundwater contamination is monitored to the Permittee's property boundary. The concentrations detected in groundwater are presently below the groundwater protection standards (GPS).

The Permittee has determined the vertical extent of groundwater contamination to a depth of approximately 100 feet below ground surface to be below the GPS.

V.C COMPLIANCE MONITORING REQUIREMENTS

The Permittee must monitor the groundwater to determine whether regulated units are in compliance with the groundwater protection standard under 40 CFR § 264.92.

V.C.1 Compliance Monitoring Program

The Compliance Monitoring Program requires monitoring at the downgradient point of compliance and at all wells designated as compliance monitoring wells at least annually. Static groundwater elevation will be measured at all wells during each sampling event.

- a. The groundwater beneath the closed hazardous waste management unit shall be monitored with one up-gradient background groundwater monitoring well (MW-7) and five (5) point-of-compliance wells (MW-18, MW-21, MW-22, MW-23 and MW-29).
- b. All wells identified in **Permit Condition V.C** shall be sampled annually for analytes listed in **Permit Attachment F**.
- c. Wells having concentrations less than or equal to GPS for a three-year period may be eliminated from the Post-Closure Care Monitoring Program with the approval of the Department.

V.C.2 Sampling and Analysis Plan

The Permittee shall use the techniques and procedures in accordance with the Groundwater Monitoring Program and Sampling and Analysis Plan as referenced in the

Permit Conditions for identified compliance monitoring wells (40 CFR § 264.97 (d) and (e)).

- a. Compliance wells listed in **Permit Condition V.C.1** will be sampled annually for the 40 CFR § 264 Appendix IX constituents identified in **Permit Attachment F**.
- b. Samples for each constituent will be collected using the methods specified in **Permit Attachment E** and analyses shall be obtained using the EPA SW-846 Methods specified in **Permit Attachment E**.
- c. Alternate methods may be approved by the Director, provided the request is in writing and submitted 30 days prior to the sampling event. Proposed alternate methods must achieve the same Limit of Quantitation (or lower) as the specified method.

V.D WELL LOCATION, INSTALLATION AND CONSTRUCTION

The Permittee shall maintain groundwater monitoring system at the locations specified and/or agreed to with the Department. The Groundwater Monitoring System shall comply with 40 CFR § Part 264.97. Any proposed changes to the Post-Closure Care groundwater monitoring system at the facility require a permit modification and must be submitted to the Director in writing.

V.D.1 Well Locations

The Permittee shall maintain all groundwater monitoring wells required by this Permit in conformance with the following:

- a. The groundwater monitoring system must: yield samples in up-gradient well(s) that represent the quality of the background groundwater unaffected by leakage from any regulated unit, and in downgradient wells yield samples that represent the quality of groundwater passing the point of compliance as defined in 40 CFR § 264.95.
- b. The number and location of monitoring wells must be sufficient to identify and define all logical release pathways from the regulated unit to the uppermost aquifer based on site-specific hydrogeologic characterization.

V.D.2 Plan and Specifications of Monitoring Wells

The Permittee shall maintain the monitoring wells identified in the Permit, in accordance with the plans and specifications presented in **Permit Attachment E**.

V.D.3 Additional or Removal of Wells

The Director must approve the addition or removal of all monitoring wells prior to installation or decommissioning.

- a. All wells deleted from the monitoring program shall be plugged and abandoned in accordance with **Permit Attachment E, Appendix 7**. Well plugging methods and abandonment certification shall be submitted to the Director within thirty (30) days from the date the wells are removed from the monitoring program.

- b. All monitoring wells added to the existing groundwater monitoring system described in **Permit Condition V.D** must be constructed in accordance with the requirements of EPA's *RCRA Groundwater Monitoring Technical Enforcement Guidance Document* (TEGD) and approved by the Department (**Permit Attachment E, Appendix 5**).

V.E GROUNDWATER PROTECTION STANDARD

The Permittee shall monitor the groundwater to determine whether the regulated units are in compliance with the Groundwater Protection Standard (GPS) under 40 CFR § 264.92. The GPS is based in part upon up-gradient concentrations from the facility's initial background monitoring, EPA Maximum Contaminant Levels (MCL), and Alternate Concentration Limits (ACL). ACLs are health-based standards calculated by Department. The hazardous constituents and their concentration limits listed in **Permit Attachment F** comprise the GPS.

V.F MONITORING PARAMETERS AND CONSTITUENTS

The Permittee shall monitor all wells as described in **Permit Conditions V.C** for all parameters and constituents specified in **Permit Attachment F**, as appropriate.

V.F.1 Constituent Concentration Determination

The Permittee must determine the concentration of hazardous constituents and parameters listed in **Permit Attachment F** in the groundwater at the point of compliance at least annually during the compliance period specified in **Permit Condition V.F.2**.

V.F.2 Constituents

The Permittee must analyze samples from the point of compliance monitoring wells for all constituents contained in Appendix IX to 40 CFR § Part 264 that are identified in **Permit Attachment F** at least annually during the compliance period.

V.F.3 Term of the Compliance Period

The term of the compliance period, during which the groundwater protection standard applies, is equal to twenty six (26) years from the date of issuance of the September 26, 1995 Permit and ends on September 26, 2021.

V.F.4 End of Compliance Period - Corrective Action

If the Permittee is conducting corrective action at the end of the compliance period specified, then the compliance period shall be extended until the Permittee demonstrates that the groundwater protection standard has not been exceeded for three (3) consecutive years.

V.G SAMPLING AND ANALYSIS PROCEDURES

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in **Permit Condition V.C**.

V.G.1 Collection Techniques

Samples shall be collected using the techniques described in **Permit Attachment E**.

V.G.2 Sample Handling Procedures

Samples shall be preserved, packed, and shipped off-site for analysis in accordance with the procedures specified in **Permit Attachment E**.

V.G.3 Sample Analysis Procedures

Samples shall be analyzed in accordance with the procedures specified in **Permit Attachment F**.

V.G.4 Sample Chain-of-Custody

Samples shall be tracked and controlled using the chain-of-custody procedures specified in **Permit Attachment E**.

V.H ELEVATION OF THE GROUNDWATER SURFACE

The Permittee shall determine the groundwater surface elevation at each monitoring well each time groundwater is sampled in accordance with **Permit Condition V.C**.

V.H.1 Elevation Reporting

The Permittee shall report the surveyed elevation of any additional or replacement monitoring well(s) when installed with as-built drawings. The total depth of wells and the elevation of the following shall be recorded: top of the casing, ground surface and/or apron elevation, and the protective casing.

V.I STATISTICAL PROCEDURES

When evaluating the monitoring results in accordance with **Permit Condition V.F.**, the Permittee shall determine whether there is statistically significant evidence of increased contamination for any hazardous constituent or parameters specified in the Groundwater Protection Standard (**Permit Attachment F**) using the statistical procedures specified in **Permit Attachment E, Appendix 6**.

V.I.1 Significant Differences

If the appropriate statistical test (specified in **Permit Attachment E, Appendix 6** and/or approved by Director) indicates that the difference between the established background (or up-gradient well concentration) and the downgradient well concentration is significant, the Permittee may resample within thirty (30) days of receipt of original laboratory data, not to exceed sixty days (60) from date of original sample collection.

- a. If the second round of analyses specified in **Permit Condition V.I.1** indicates that the difference is significant, the Permittee shall conclude that a statistically significant change has occurred and the constituent shall be added to the Compliance Monitoring Program Constituent List (**Permit Attachment F**).
- b. If no second round of analysis is collected, then the statistical increase is confirmed and the constituent shall be added to the Compliance Monitoring Program Constituent List (**Permit Attachment F**).

V.I.2 Empirical Comparison

The Permittee may elect to perform a simple empirical comparison of Point of Compliance data to the GPS (**Permit Attachment F**) instead of the statistical procedures specified in **Permit Attachment E, Appendix 6**.

V.J **MONITORING PROGRAM AND DATA EVALUATION**

The Permittee shall collect, preserve, and analyze groundwater samples in accordance with EPA methods, collected from all monitoring wells specified in **Permit Condition V.C** at least annually.

V.J.1 Concentrations

The Permittee shall determine the concentration of hazardous constituents and/or parameters, as specified in **Permit Attachment F** at least annually in accordance with 40 CFR § 264.99(a).

V.J.2 Groundwater Determination

The Permittee shall determine the groundwater flow rate and direction in the uppermost aquifer at least annually.

V.J.3 Sample Analysis

The Permittee shall analyze samples from all monitoring wells at compliance wells as specified in **Permit Condition V.C**, for all constituents identified in **Permit Attachment F** at least annually to determine whether additional, hazardous constituents are present in the uppermost aquifer.

- a. If the Permittee finds Appendix IX to 40 CFR § 264 constituents in the groundwater that are not already identified in the permit as monitoring constituents, the Permittee may resample within one month and repeat the Appendix IX analysis. (40 CFR § 264.99 (g)) If the second analysis confirms the presence of new constituents, the Permittee must report the concentration of these additional constituents to the Director within seven (7) days after completion of the second analysis and add them to the monitoring list. If resampling is intended, the Permittee shall include the proposed sampling date with the notification.
- b. If the second analysis confirms the presence of new constituents, the Permittee shall report the concentration of these constituents to the Director in writing within seven (7) days after the data is available from the laboratory and add them to the Compliance Monitoring Program Constituent List (**Permit Attachment F**).
- c. If the Permittee chooses not to resample, then the Permittee shall report the concentrations of these additional constituents to the Director within seven (7) days after the data is available from the laboratory and add them to the Compliance Monitoring Program Constituent List (**Permit Attachment F**).
- d. As a result of detected Appendix IX to 40 CFR § 264 constituent(s), the Permittee may demonstrate that a source other than the Regulated Unit caused the detection pursuant to 40 CFR § 264.99(i). The Director shall be notified of the Permittee's intent to make the demonstration in conjunction with either the

initial notification that a new constituent was detected or with the confirmation notice after the resampling. The results of the demonstration will be submitted to the Director within ninety (90) days of the notification.

V.J.4 New Constituents Found

If the second analysis (**Permit Condition V.J.3.a**) confirms the presence of constituents not included in the Compliance Monitoring program or if the Permittee chooses not to resample (**Permit Condition V.J.3.b**), the Permittee shall establish the background values for each additional Appendix IX to 40 CFR § 264 constituent found in the groundwater in accordance with the following procedures:

- a. Background groundwater quality for a newly listed monitoring parameter or constituent shall be based on data from at least four (4) independent samples collected within one year from the up-gradient monitoring well, as specified by **Permit Condition V.C**.
- b. For each additional Appendix IX to 40 CFR § 264 constituent confirmed in accordance with **Permit Condition V.J.3**, the Director shall establish a Groundwater Protection Standard and amend **Permit Attachment F**. The background value determined through **Permit Condition V.J.4.a** will be utilized as the GPS under 40 CFR § 264.92 if no applicable MCL is listed in the EPA Safe Drinking Water Act for that constituent or the background concentration in the upgradient well exceeds the listed MCL. The Director may establish an ACL in accordance with 40 CFR §264.94(b).

V.J.5 Statistical Significance

For each hazardous constituents identified in **Permit Attachment F**, the Permittee shall determine whether there is statistically significant evidence of increased contamination for any parameter or chemical constituent each time the concentration of hazardous constituents is monitored in groundwater at the point of compliance; pursuant to **Permit Condition V.I**. In determining whether such an increase has occurred, the Permittee shall compare, either statistically or empirically, the groundwater quality at each monitoring well specified in **Permit Condition V.C** of the Permit, to the background concentration for that constituent, in accordance with the procedures specified in **Permit Attachment E, Appendix 6**, if appropriate.

- a. If the appropriate statistical test indicates that the difference between the established background concentration and the downgradient well concentration is statistically significant, the Permittee shall notify the Director in writing within seven (7) days of the determination.
- b. The Permittee shall perform the statistical evaluation required by **Permit Condition V.I** within 30 days from the date the analytical results are available from the laboratory performing the analyses.

V.J.6 Analytical Data Presentation

The Permittee shall present the groundwater quality at each monitoring well in a form appropriate for the determination of statistically significant increases, in accordance with 40 CFR § 264.97(h). The Permittee's report shall include at least the following

information: the constituents analyzed; the SW-846 test methods; a summary of the internal laboratory quality assurance/quality control (QA/QC); matrix spike duplicates; percent recovery; duplicate analyses; dilution factors; laboratory specific limit of detection and limit of quantitation; and the results of any screening analyses.

V.J.7 Constituent Removal

If a monitoring constituent added to the monitoring list in accordance with **Permit Condition V.J.3** has not been detected over a period of two (2) consecutive sampling periods in two years, the facility may notify the Department and request to remove the constituent from the monitoring list. The Department will consider approval of such a request, provided the detection limit for the reported data is below the applicable groundwater protection standard for the constituent. The Director's approval would be subject to the standard in 40 CFR § 264.93(b). The preceding relief does not preclude the continued requirement of **Permit Condition V.J.3** to sample for the each hazardous constituents identified in **Permit Attachment F** at least annually.

V.K COMPARISON TO GROUNDWATER PROTECTION STANDARDS

At least annually, the Permittee shall compare the groundwater concentration of each Compliance Monitoring Program Constituent contained in **Permit Attachment F** from each Point of Compliance Well to the Groundwater Protection Standard (**Permit Attachment F**) for that constituent. The following procedures shall be used.

- a. If a single independent sample was collected at each monitoring well during a specific monitoring event, the Permittee shall conduct a simple empirical comparison of the GPS and the measured value.
- b. If multiple independent samples were collected from each monitoring well, a statistical comparison to the GPS, which has been approved by the Director, shall be conducted. Guidelines for method selection are contained in **Permit Attachment E, Appendix 6**.

V.K.2 GPS Exceedance

For constituents that have exceeded the Groundwater Protection Standard during previous sampling events, the Permittee shall submit written notification to the Director within seven (7) days of determining that the GPS has been exceeded.

The notification shall include the following:

- a. Concentration of the constituent(s) exceeding the GPS,
- b. Identification of the monitoring well where the GPS was exceeded, and
- c. Map showing the extent of the groundwater contaminant plume with concentrations mapped

V.K.3 Demonstration of GPS Source

The Permittee may make a demonstration that the groundwater protection standard as indicated in **Permit Attachment F** was exceeded due to sources other than the unit; errors in sampling, analysis, and evaluation; or natural variation in the groundwater. The demonstration shall be conducted as follows:

- a. The Permittee shall include in the notification to the Director in **Permit Condition V.K.1**, that the demonstration will be attempted.
- b. Resampling must be conducted within thirty (30) days of receipt of original laboratory data, not to exceed sixty days (60) from date of original sample collection.
- c. Four (4) independent samples shall be collected from the well for each constituent the Permittee includes in the demonstration. A statistical evaluation of the data shall be conducted using a statistical method approved by the Director.
- d. The Permittee must submit a report to the Director within 90 days of the notification that demonstrates a source other than the regulated unit caused the groundwater protection standard to be exceeded or that the apparent noncompliance was a result of an error in sampling, analysis, or evaluation. The Permittee must also submit to the Director within 90 days of the notification in **Permit Condition V.K.1** an application for a permit modification to make any appropriate changes in the Compliance Monitoring Program.
- e. The Permittee must continue to monitor in accordance with the Compliance Monitoring Program established under 40 CFR § 264.99.

V.K.4 Exceedance Reporting

The Permittee shall specify all Groundwater Protection Standard exceedances from the reported sampling event in the Annual Monitoring Report.

V.L **REPORTING AND RECORDKEEPING**

The Permittee shall enter all monitoring, testing, and analytical data obtained pursuant to **Permit Condition V.I** in the operating record. The data must include all computations and results of approved statistical tests.

V.L.1 Required Analytical Results

The Permittee shall submit the required analytical results (**Permit Conditions V.J.3 and V.J.4**) at least annually or whenever there is a change in flow rate or direction, or statistically significant evidence of increased contamination in one or more of the hazardous constituents being monitored.

V.L.2 Evidence of GPS Exceedance

Pursuant to **Permit Condition V.J**, if the Permittee determines there is a statistically significant evidence of increased contamination above the concentration limits specified in **Permit Attachment F** for the constituents specified in **Permit Condition V.C** (indicating that the groundwater protection standard is being exceeded), at any monitoring well at the point of compliance, the Permittee shall notify the Director in writing within seven (7) days.

V.M **ASSURANCE OF COMPLIANCE**

The Permittee shall demonstrate to the Director that groundwater monitoring and corrective action measures necessary to achieve compliance with the groundwater protection standard under 40 CFR § 264.92 are taken during the term of the Permit.

V.N SPECIAL REQUIREMENT IF THE GROUNDWATER PROTECTION STANDARD IS EXCEEDED

The Permittee must notify the Director in writing within seven (7) days if the groundwater protection standard (**Permit Attachment F**) has been exceeded at any well for any constituent contained in **Permit Attachment F** pursuant to **Permit Condition V.K**. The notification must indicate specifically which concentration limits have been exceeded.

V.N.1 Corrective Action Modification Requirements

The Permittee must submit to the Director a permit modification to establish a corrective action program meeting 40 CFR § 264.100 requirements within 180 days, or within 90 days if the Permittee has previously submitted an engineering feasibility study.

V.N.2 GPS Demonstration

The Permittee may make a demonstration that the groundwater protection standard as indicated in **Permit Attachment F** was exceeded due to sources other than a regulated unit or errors in sampling, analysis, evaluation, or natural variation in the groundwater pursuant to **Permit Condition V.K.2**.

V.O REQUESTS FOR PERMIT MODIFICATION

If the Permittee or the Director determines the groundwater protection standard presented in **Permit Attachment F** is being exceeded, the Permittee shall submit to the Director an application for a permit modification to establish a Corrective Action Program meeting the requirements of 40 CFR § 264.100 within 180 days of receipt of the Director's determination that corrective action is required.

V.O.1 Compliance Monitoring Program Validity

If the Permittee or the Director determines the Compliance Monitoring Program no longer satisfies the requirements of 40 CFR § 264.99, then within 90 days the Permittee must submit an application for a permit modification to make any appropriate changes.

MODULE VI - SITE-WIDE CORRECTIVE ACTION

VI.A CORRECTIVE ACTION FOR CONTINUING RELEASES; PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

VI.A.1 Required Corrective Action

Section 3004(u) of RCRA, 42 U.S.C. § 6924(u), and regulations codified under 40 CFR § 264.101, provide that all permits issued after November 8, 1984, must require corrective action (CA) as necessary to protect human health and the environment for all releases of hazardous waste or hazardous constituents from any solid waste management unit (SWMU), regardless of when waste was placed in the unit.

VI.A.2 CA Boundary

Under Section 3004(v) of RCRA, 42 U.S.C. § 6924(v), and 40 CFR § 264.101(c), the Department may require that CA at a permitted facility be taken beyond the facility boundary where necessary to protect human health and the environment, unless the owner or operator of the facility concerned demonstrates to the satisfaction of the Department that, despite the owner or operator's best efforts, the owner or operator was unable to obtain the necessary permission to undertake such action.

VI.A.3 Terms and Conditions

Section 3005(c) (3) of RCRA, 42 U.S.C. § 6925(c)(3), and 40 C.F.R. § 270.32(b) provide that each permit shall contain such terms and conditions as the Department determines necessary to protect human health and the environment.

VI.B CORRECTIVE MEASURES IMPLEMENTATION

VI.B.1 Background

Corrective actions are applicable to the Facility. Facility description, background, and environmental history are provided in **Permit Attachment B**.

VI.B.2 Final Remedy Selection

Based on the findings of the RFI (RCRA Facility Investigation), the Department concluded that operations at the facility resulted in soil and groundwater contamination. Such releases have been abated and there are no ongoing releases to the surface or subsurface. In addition, operations and waste management, including disposal, at the facility have ceased. Constituents of concern (COCs) detected in groundwater include TCE and associated breakdown products. Constituents of concern in soil consist of lead and asbestos. Documentation for completion of investigation reports and studies has been compiled by the Department, entitled Administrative Record. Based on the Corrective Measures Study (CMS) results and the Administrative Record, the final remedy for the Facility was developed and is described in the Statement of Basis, dated October 31, 2016. The requirements of this Permit provide for the operation and maintenance of the remedy described in the Statement of Basis.

VI.B.3 Remedy Controls

The goal of the remedy for corrective action is to ensure protection of human health and the environment. The final remedy for the Site consists of active remediation, long term groundwater monitoring, and implementing Institutional and Engineering Controls, as set forth in the Permit. Institutional Controls (ICs) are generally non-engineered mechanisms such as administrative and/or legal controls that minimize the potential for human exposure to contamination and/or protect the integrity of a remedy. Engineering Controls (ECs) are generally engineered mechanisms such as a landfill cap.

VI.B.4 Final Remedy Actions

The details of the final remedy are summarized below and are described in more detail in the Administrative Record and Statement of Basis. Modifications in the activities, studies, techniques, procedures, and designs or schedules utilized in carrying out the requirements of this Permit and necessary for the completion of the remedy may be made by written agreement from the Department. Under this final remedy, the Department is requiring the following actions:

- a. Continue the groundwater monitoring program to monitor the progress of the active remedial measures and confirm hazardous constituents do not migrate beyond the facility boundary at concentrations above their Groundwater Protection Standard.
- b. Continue operation of the in situ chemical oxidation (ISCO) system at AOC-1 until cleanup targets have been met or data indicates asymptotic treatment effectiveness.
- c. Continue the inspection and maintenance of the existing Engineering Controls; consisting of the caps and asphalt cover of the closed landfills and SWMU #5.
- d. Implementation and maintenance of institutional controls (ICs) and engineering controls (ECs) consisting of property use restrictions for groundwater and soil in accordance with **Permit Condition VI.B.5**.

VI.B.5 Final Remedy Implementation

The groundwater remedy components shall be implemented in accordance with the Department approved remediation and monitoring plan and shall include:

- a. Excavation and disturbance in RCRA capped and asphalt areas shall be prohibited except as approved by the Department in writing.
- b. The closed landfills and SWMU #5 area, identified in **Permit Attachment A**, shall not be used for residential purposes or for children's (under the age of 16) daycare facilities, schools, or playground purposes.
- c. Groundwater beneath the property shall not be used for any purposes except for environmental monitoring and testing, or for non-contact industrial use as approved by the Department. Any new groundwater wells installed at the facility must be approved by the Department.
- d. Require inspection and maintenance of the cap and cover of landfills and SWMU #5, **Permit Condition VI.B.4**.
- e. Require vapor intrusion mitigation measures to be installed in any existing or newly constructed totally enclosed building(s) designed for occupation within

100 feet of the footprint of groundwater having site-related VOCs and SVOCs identified above protective levels (MCLs/ACLs), unless it is demonstrated to the Department that vapor mitigation is not necessary to protect human health. For existing building(s) that are designed for occupation but are not currently occupied (i.e. vacant), no vapor intrusion mitigation measures will be required. The need for vapor intrusion mitigation measures for vacant buildings shall be assessed should the use of such building(s) be modified from its current use in such a manner that vapor intrusion could reasonably become an unacceptable human health risk. Vapor intrusion mitigation measures may be waived with DEQ approval based upon a demonstration that mitigation measures are not necessary for protection of human health.

- f. The Permittee shall, at a minimum, record notice of the property use restrictions in the deed for the property such that prospective purchasers of the property will have constructive notice of land use restrictions. Additionally, the Permittee shall notify the Department in writing of any proposed changes in the use of the property or proposals for any site work, which in either case affects the contamination or its disposition on the property.
- g. The Permittee has provided coordinate surveys for applicable property use restrictions that meet the following requirements:
 - i. Define the boundary of each use restriction as a polygon
 - ii. Establish the longitude and latitude of each polygon vertex as follows
 - 1. Decimal degrees format
 - 1. At least seven decimal places
 - 2. Negative sign for west longitude
 - 3. WGS 1984 datum

VI.C EVALUATION OF THE SELECTED REMEDY

The Permittee shall submit an annual progress report on the remedy performance. If the Department determines that the selected remedy will not comply with the media clean-up requirements, the Department may require the Permittee to perform additional studies and/or perform modifications to the existing Corrective Action remedy. If necessary, the Department or the Permittee may seek modification of this Permit pursuant to 40 CFR § 270.41 or § 270.42 and §124.5 to implement modifications to the existing Corrective Measures Remedy.

VI.D EMERGENCY RESPONSE; RELEASE REPORTING

VI.D.1 Emergencies

If, at any time during the term of this Permit, the Permittee discovers that a release of hazardous waste or hazardous constituents at or from the Facility is presenting or may present an imminent and substantial endangerment to human health or the environment, and such release is not subject to a Contingency Plan and Emergency Procedures, as applicable to the facility, and as defined in the portion of the RCRA Permit issued by the Department, the Permittee shall:

- a. Notify the Department as soon as practicable of the source, nature, extent, location, and the amount of such release, the endangerment posed by such release and the actions taken and/or to be taken, to the extent known, to address such release. Such notification shall also be confirmed in writing within three (3) days of discovery of such release.
- b. Unless otherwise directed by the Department, immediately take such actions as are necessary and appropriate to address such release to protect human health and the environment.

VI.D.2 Releases

The Permittee shall notify the Department in writing of the nature, source, extent, and location of a release of hazardous waste or hazardous constituents at or from the Facility within seven (7) days of discovery of such release which:

- a. Is not being addressed by corrective measures at the time of such discovery.
- b. Is not being addressed pursuant to **Permit Condition VI.D.1. Emergencies**.
- c. Is not subject to the Contingency Plan and Emergency Procedures, as applicable, if set forth in the portion of the RCRA Permit issued by the Department.

VI.E REQUIREMENTS OF SWMU AND AOC

Based on the information submitted in **Permit Condition VI.D.2, Releases**, the Department may require the SWMU and/or AOC to be included in a RCRA Facility Investigation or may require Interim Measures.

VI.F DEPARTMENT'S AUTHORITY

Nothing in this Permit shall limit the Department's authority to undertake or require any person to undertake response action or corrective action under any law, including but not limited to, Sections 104 or 106 of CERCLA, 42 U.S.C. §9604 or 9606, and Section 7003 of RCRA, 42 U.S.C. § 6973. Nothing in this Permit shall relieve the Permittee of any obligation it may have under any law, including, but not limited to, Section 103 of CERCLA, to report releases of hazardous waste, hazardous constituents or hazardous substances to, at or from the Facility.

VI.G GUIDANCE DOCUMENTS

Any corrective action performed at the facility shall be in general accordance with applicable EPA RCRA corrective action guidance available at:

<https://www.epa.gov/hwcorrectiveactionsites/corrective-action-resources-specific-epas-region-3>.

VI.G.1 Applicability Demonstration

Such guidance shall not be deemed to be applicable if Permittee demonstrates to the Department that such guidance is not suitable for facility circumstances.

VI.H SOLID WASTE MANAGEMENT UNIT (SWMU) ASSESSMENT

VI.H.1 Newly Identified SWMU

The Permittee shall notify the Department and the EPA Region III, in writing, of any newly identified SWMU at the Facility, no later than thirty (30) days after the date of discovery. The notification shall include, but not be limited to, the following known information:

- a. A description of the SWMUs type, function, dates of operation, location (including a map), design criteria, dimensions, materials of construction, capacity, ancillary systems (e.g., piping), release controls, alterations made to the unit, engineering drawings, and all closure and post-closure information available, particularly whether wastes were left in place.
- b. A description of the composition and quantities of solid wastes processed by the units with emphasis on hazardous wastes and hazardous constituents.
- c. A description of any release (or suspected release) of hazardous waste or hazardous constituents originating from the unit. Include information on the date of release, type of hazardous waste or hazardous constituents, quantity of the release, nature and extent of release migration, and cause of release (e.g., overflow, broken pipe, tank leak, etc.). Also, provide any available data that quantifies the nature and extent of environmental contamination, including the results of soil and/or groundwater sampling and analysis efforts. Likewise, submit any existing monitoring information that indicates releases of hazardous waste or hazardous constituents has not occurred or is not occurring.
- d. A discussion of the need for and feasibility of implementing interim measures immediately.

VI.H.2 New SWMU Department Determination

Upon receipt of the notification of any newly identified SWMU, the Department will determine the need for corrective action at such SWMU. If corrective action is necessary to protect human health or the environment, the Department will determine whether a RCRA Facility Investigation will be performed and the need for and scope of any Interim Measures for a newly identified SWMU.

VI.H.3 Actions for New SWMU

Within sixty (60) days after receipt of the Director's determination that a RCRA Facility Investigation or Interim Measures is necessary, the Permittee shall submit a RCRA Facility Investigation Work Plan or Interim Measures Work Plan that meets the applicable guidance. The Department's determination shall either specify the media and/or parameters to be investigated or shall require the Permittee to propose and justify the selection of media and/or parameters.

VI.H.4 Reports

Within the time specified in the approved RCRA Facility Investigation Work Plan or Interim Measures Work Plan, the Permittee shall submit the RCRA Facility Investigation Report or Interim Measures Report. The reports will provide all data necessary for the Department to determine whether a Corrective Measures Study or additional Interim Measures Work Plan is required.

VI.H.5 RCRA Facility Investigation and Corrective Measures

In lieu of a separate RCRA Facility Investigation, the Permittee may propose to incorporate any newly identified SWMU into the ongoing RCRA Facility Investigation or to submit a proposal for the performance of corrective measures at such newly identified SWMU. Any such proposal shall be submitted to the Department along with notification of the discovery of the SWMU(s).

VI.I FINANCIAL ASSURANCE

VI.I.1 Initial Cost Estimate

Assurances of financial responsibility for corrective action must be provided in accordance with conditions herein. The Permittee submitted an initial cost estimate for completion of the approved remedy(s) as a component of the CMI Work Plan submitted to the Department in June 2006.

VI.I.2 Cost Estimates Updated

The cost estimate for completing the approved remedy(s) shall be updated pursuant to the development of more detailed information (e.g., Corrective Measure Design) and any modifications to the approved remedy(s).

Within ninety (90) calendar days of receipt of the Department's written approval of modifications to the final remedy, the Permittee shall submit an updated cost estimate to the Department.

VI.I.3 Financial Assurance Demonstration

Within thirty (30) calendar days of approval of the initial cost estimate for financial assurance, the Permittee shall demonstrate compliance with financial assurance to the Department for completing the approved remedies in accordance with 40 CFR § 264.101(b). Within thirty (30) calendar days of approval of any revised cost estimate, the Permittee shall demonstrate to the Department financial assurance for the updated cost estimates.

VI.J COMMUNITY RELATIONS

The Permittee shall implement actions as necessary to meet the information needs of the community during implementation of corrective measures at the site.

VI.J.1 Actions

The Permittee shall establish and maintain a public repository for documents relating to the corrective action at the Public Library. Past documents shall be made available in electronic form and current documents shall be available in both electronic form and hard copy.

- a. Upon request from the Department, the Permittee shall distribute fact sheets and other information to persons on the Facility Mailing List maintained by the Department
- b. Upon request from the Department due to the identification of any new significant information, the Permittee shall conduct a public meeting as necessary to comply with regulatory requirements.

VI.K RECORDKEEPING

Upon completion of closure of any SWMU, the Permittee shall maintain in the Facility operating record, documentation of the closure measures taken.

VI.L ACCESS FOR CORRECTIVE ACTION OVERSIGHT

The Department and its authorized representatives shall have access to the Facility at all reasonable times for the purpose of monitoring compliance with the provisions of this Permit. The Permittee shall use its best efforts to obtain access to property beyond the boundaries of the Facility at which corrective action is required by this Permit (see Section 3004(v) of RCRA, 42 U.S.C. § 6924(v) and 40 CFR § 264.101(c)) for: (1) the Permittee and any contractor of the Permittee for the purpose of taking corrective action required by this Permit, and (2) the Department and its authorized representatives for the purposes described in this paragraph.

VI.M COMPLETION OF REMEDY

When the Permittee determines the remedy required by this Permit is complete, the Permittee shall submit a written notification and certification to the Department stating that the remedy has been completed in accordance with requirements of this Permit. No later than 90 days after receipt of the receipt of notification and the certification from the Permittee, the Department shall either approve or deny the determination of remedy completion. The certification must be signed by the Permittee and by an independent, Virginia registered professional engineer.

VI.M.1 No Permit Conditions Remain

In cases where no other Permit Conditions remain, the Permit may be modified not only to reflect the determination that remedy controls are no longer necessary, but also to change the expiration date of the Permit to allow for earlier Permit expiration in accordance with 40 CFR § 124, 270.41, and 270.42 as applicable.

VI.M.2 Well Abandonment

Upon completion of the remedy or as needed in the interim, the Permittee shall request approval for abandonment of all monitoring wells, observation wells, and remediation wells from the Department prior to implementing well abandonment activities. All wells that are to be abandoned shall be plugged and abandoned in general accordance with 12VAC 5-630-420 and 12VAC 5-630-450. Chlorination of each well is not required. An effort to remove the well casing and associated materials shall be made at each well prior to abandonment. A report including methods and certification shall be submitted to the Department within thirty (30) days following the completion of abandonment. The Permittee may propose alternate methods for well abandonment and must obtain approval from the Department prior to implementation.

ATTACHMENT A
FACILITY MAPS AND FIGURES

SWMU AND AOC AREAS (Locations are Approximate)



● Post-Closure Monitoring Well (approximate location)

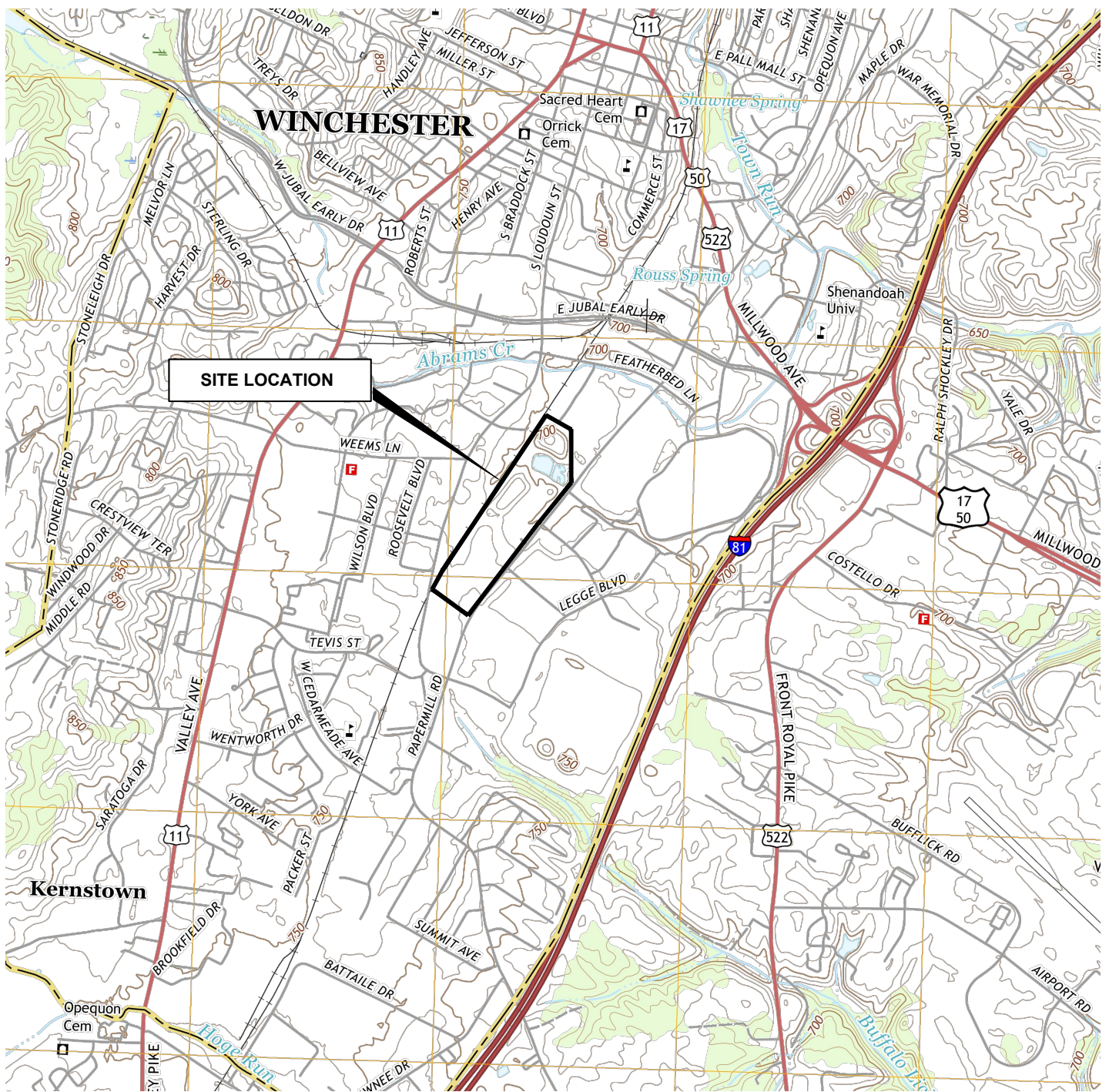
Solid Waste Management Unit (SWMU)
Area of Concern (AOC)

Drawn By RLM
CADD Review
Date Drawn/Rev'd 6/27/16



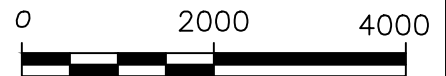
<h2 style="margin: 0;">FEDERAL-MOGUL SITE LAYOUT</h2> <p style="margin: 0;">WINCHESTER, VIRGINIA</p> <h3 style="margin: 0;">Environmental Resources Management</h3>	<p>CHK'D MC</p> <p>0334437</p> <p>ATTACHMENT A - 1</p>
---	--

TOPOGRAPHIC MAP



1	2	3	1 Gore
4	5	6	2 White Hall
7	8	9	3 Inwood
			4 Hayfield
			5 Stephenson
			6 Middletown
			7 Stephens City
			8 Boyce

WINCHESTER, VIRGINIA 2016



RLM/7/26/16

FEDERAL – MOGUL FACILITY

WINCHESTER, VIRGINIA

Environmental Resources Management

CADD Review
RLM

CHK'D
MC

0334437

ATTACHMENT A-2



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FORMER HAZARDOUS WASTE MANAGEMENT UNITS



CLOSED LANDFILL with
RCRA CAP (FORMER WASTEPILE)

APPROXIMATE
PROPERTY
BOUNDARY

CLOSED LANDFILL with
RCRA CAP (FORMER SURFACE
IMPOUNDMENTS 1 & 2)



H:\DWG\G16\0334437A01.dwg

Drawn By
RLM
CADD Review
Date Drawn/Rev'd
7/26/2016



FEDERAL — MOGUL FACILITY

WINCHESTER, VIRGINIA

Environmental Resources Management

CHK'D
0334437
ATTACHMENT A - 3

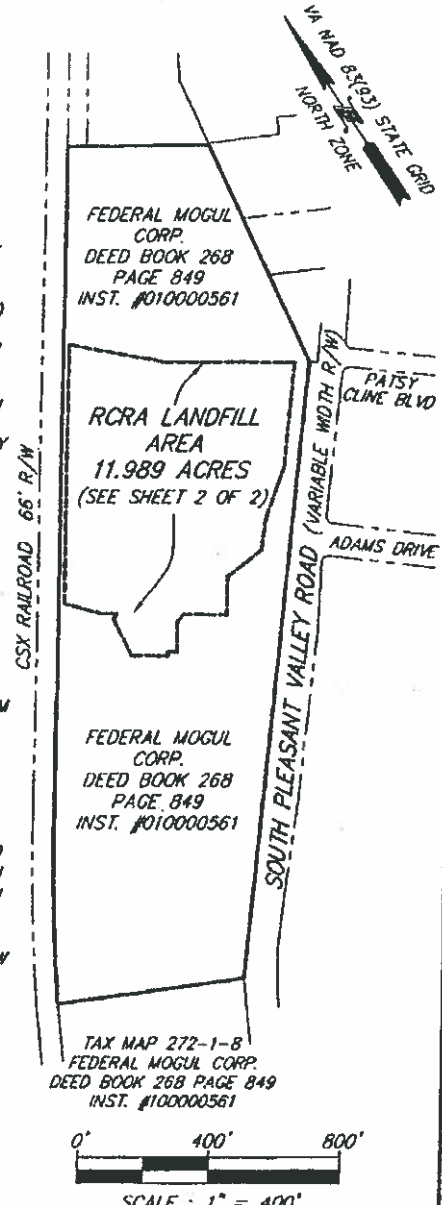
**PROPERTY LAND SURVEY -
DEED**

NOTES:

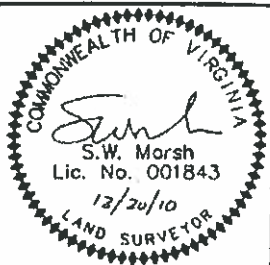
1. THE RCRA LANDFILL AREA SHOWN HEREON IS BASED ON AN ACTUAL FIELD SURVEY COMPLETED DURING APRIL AND MAY OF 2010.
2. THE PERIMETER BOUNDARY INFORMATION FOR THE FEDERAL MOGUL CORP. LAND SHOWN HEREON HAS BEEN COMPILED FROM DEEDS AND PLATS OF RECORD AND ORIENTED TO THIS PLAT BASED ON PROPERTY CORNERS FOUND AT THE TIME OF THE FIELD SURVEY.
3. NO TITLE REPORT FURNISHED; THEREFORE, THE PROPERTY MAY BE SUBJECT TO EASEMENTS AND/OR ENCUMBRANCES THAT ARE NOT SHOWN ON THIS PLAT.
4. THIS SURVEY HAS BEEN PREPARED FOR THE PURPOSE OF DEFINING THE LIMITS OF THE RCRA LANDFILL AREA SITUATED ON THE LAND OF FEDERAL MOGUL CORP. (FORMERLY KNOWN AS AMERICAN BRAKE SHOE COMPANY) DESIGNATED AS CITY OF WINCHESTER TAX PARCEL 272-1-8. THIS PLAT IS NOT INTENDED AS A PERIMETER BOUNDARY SURVEY OR SUBDIVISION PLAT OF THE FEDERAL MOGUL CORP. LAND.
5. HORIZONTAL ORIENTATION FOR THIS SURVEY HAS BEEN ESTABLISHED USING GPS METHODS REFERENCED TO THE SURVEY CONTROL STATIONS AS ESTABLISHED BY THE CITY OF WINCHESTER, VIRGINIA.
6. THE OWNER AND ITS AGENTS MAY NOT EXCAVATE OR DISTURB THE AREA SHOWN AS THE RCRA LANDFILL ON THIS SURVEY EXCEPT WITH THE WRITTEN PERMISSION OF THE VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY AS SET FORTH IN THE DEED RESTRICTION FOR THE RCRA LANDFILL (RESTRICTED PROPERTY).

RCRA LANDFILL AREA METES AND BOUNDS DESCRIPTION:

"BEGINNING AT AN IRON ROD SET (SAID ROD CAN BE FOUND BY MEASURING S 37° 21' 34" W - 633.29 FEET FROM A CONCRETE MONUMENT FOUND IN THE SOUTHERLY LINE OF THE FEATHERBED SQUARE, LLC LAND); THENCE RUNNING THROUGH THE FEDERAL MOGUL CORP. LAND FOR THE TWENTY-FOUR (24) FOLLOWING COURSES: S 46° 34' 18" E - 299.00 FEET TO AN IRON ROD SET; THENCE S 56° 52' 24" E - 403.00 FEET TO AN IRON ROD SET; THENCE S 38° 07' 52" W - 330.00 FEET TO AN IRON ROD SET; THENCE S 52° 16' 18" W - 165.00 FEET TO AN IRON ROD SET; THENCE S 40° 46' 27" W - 105.00 FEET TO AN IRON ROD SET; THENCE S 83° 58' 16" W - 132.00 FEET TO AN IRON ROD SET; THENCE S 33° 15' 21" W - 120.00 FEET TO AN METAL FENCE POST; THENCE N 56° 34' 35" W - 135.00 FEET TO A POINT; THENCE S 70° 17' 06" W - 32.00 FEET TO A POINT; THENCE S 32° 36' 41" W - 92.00 FEET TO A POINT; THENCE N 56° 33' 38" W - 27.00 FEET TO A POINT; THENCE S 32° 36' 41" W - 12.00 FEET TO A POINT; THENCE N 56° 33' 38" W - 112.00 FEET TO A POINT; THENCE N 06° 01' 47" E - 126.00 FEET TO A POINT; THENCE N 66° 03' 55" E - 21.00 FEET TO A POINT; THENCE N 56° 34' 35" W - 50.00 FEET TO A METAL GATEPOST; THENCE N 41° 45' 52" W - 117.00 FEET TO AN IRON ROD SET; THENCE N 33° 23' 00" E - 813.00 FEET TO THE POINT OF BEGINNING."



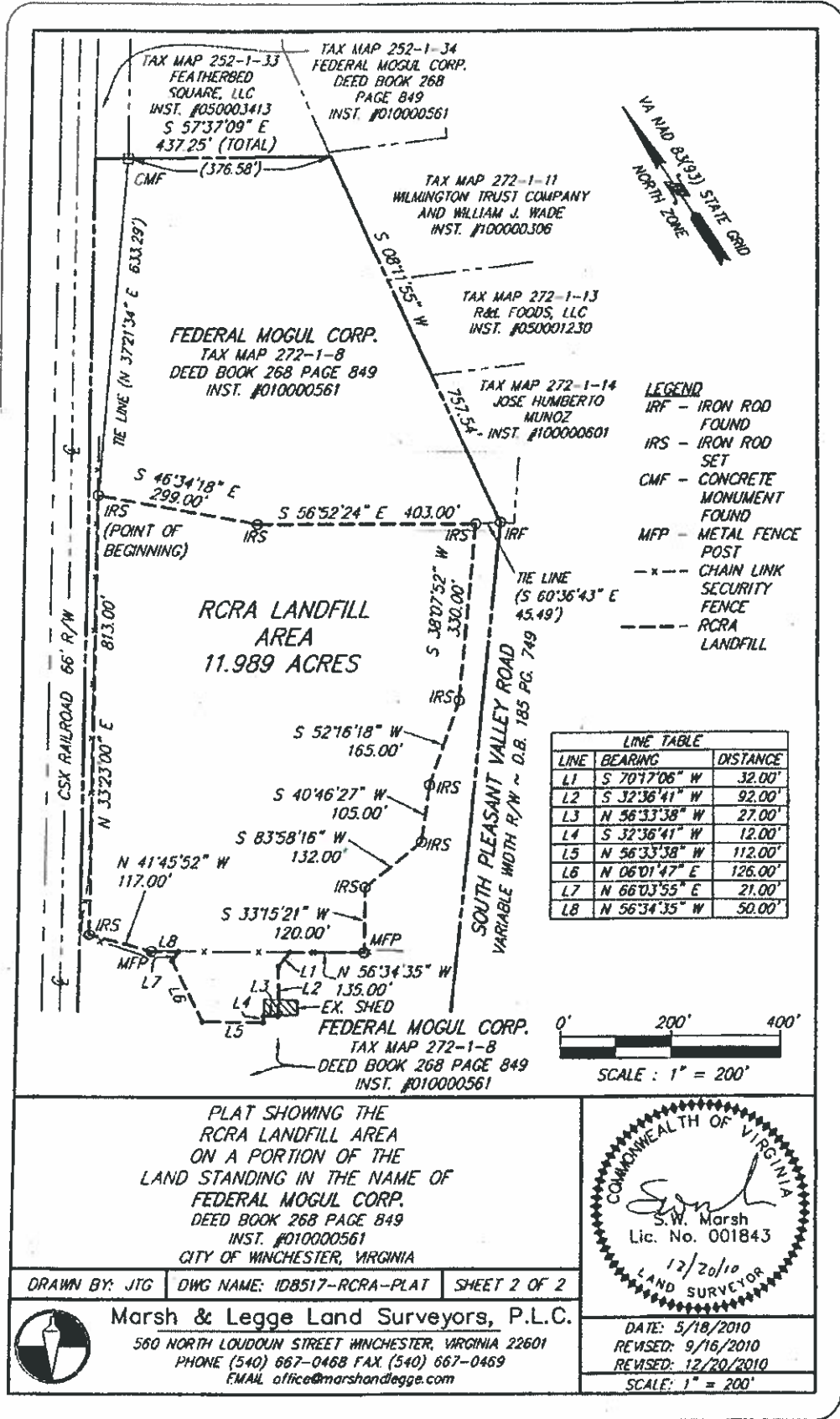
PLAT SHOWING THE RCRA LANDFILL AREA ON A PORTION OF THE LAND STANDING IN THE NAME OF FEDERAL MOGUL CORP. DEED BOOK 268 PAGE 849 INST. #010000561 CITY OF WINCHESTER, VIRGINIA



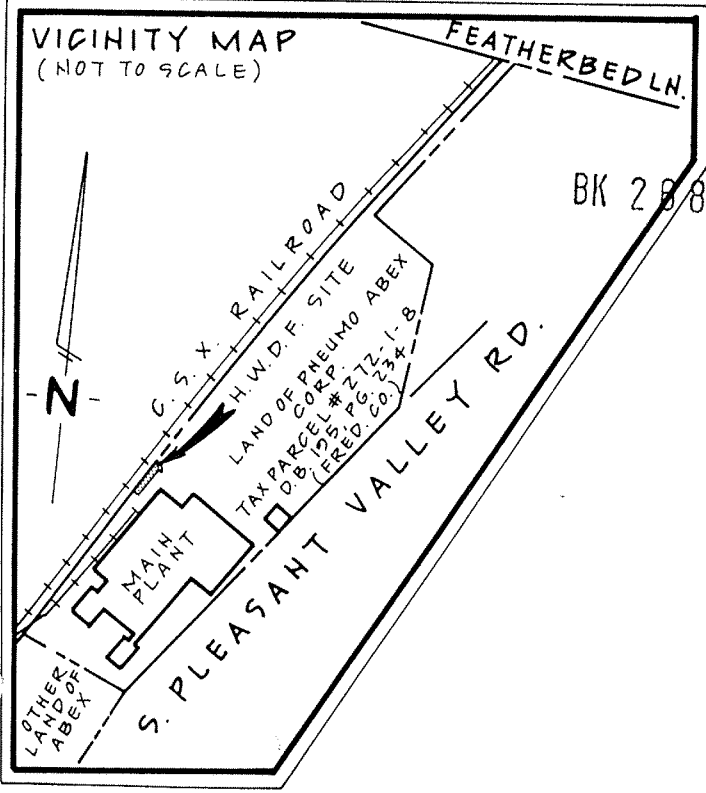
DRAWN BY: JTG DWG NAME: ID8517-RCRA-PLAT SHEET 1 OF 2

Marsh & Legge Land Surveyors, P.L.C.
 560 NORTH LOUDOUN STREET WINCHESTER, VIRGINIA 22601
 PHONE (540) 667-0468 FAX (540) 667-0469
 EMAIL office@marshandlegge.com

DATE: 5/18/2010
 REVISED: 9/16/2010
 REVISED: 12/20/2010
 SCALE: 1" = 400'



VICINITY MAP
(NOT TO SCALE)



BK 288 PG 1533

HAZARDOUS WASTE
DISPOSAL FACILITY
(SHADED AREA)
(SEE DETAIL
SHEET 2 OF 2)

N 35° 30' 36" E
200.02'

METAL
SILED

IRON
PIN
FOUND

H 34° 39' 03" E - 494.79'

MAIN PLANT BUILDING

IRON
PIN
FOUND

C.S.X. RAILROAD

DELTA: 01° 14' 01" , RAD = 11075.80'
ARC = 238.47' , TAN = 119.24'
CH. = N 34° 02' 02" E - 238.47'

IRON
PIN
FOUND

MAGNETIC NORTH - 1988

DELTA: 04° 15' 39" , RADIUS = 4820.03'
ARC = 358.74' , TANGENT = 179.30'
CHORD = N 31° 17' 02" E - 358.35'

IRON
PIN
FOUND

572.75'
N 63° 49' 56" W

PLAT SHOWING
HAZARDOUS WASTE
DISPOSAL FACILITY

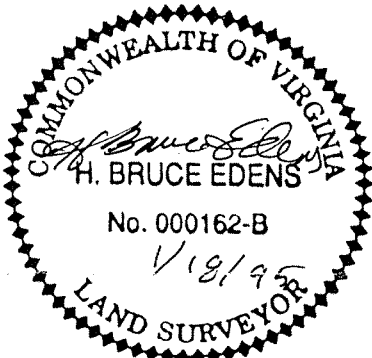
ON THE PROPERTY OF

PNEUMO ABEX
CORPORATION

CITY OF WINCHESTER,
VIRGINIA

SCALE: 1" = 100'

JANUARY 18, 1995

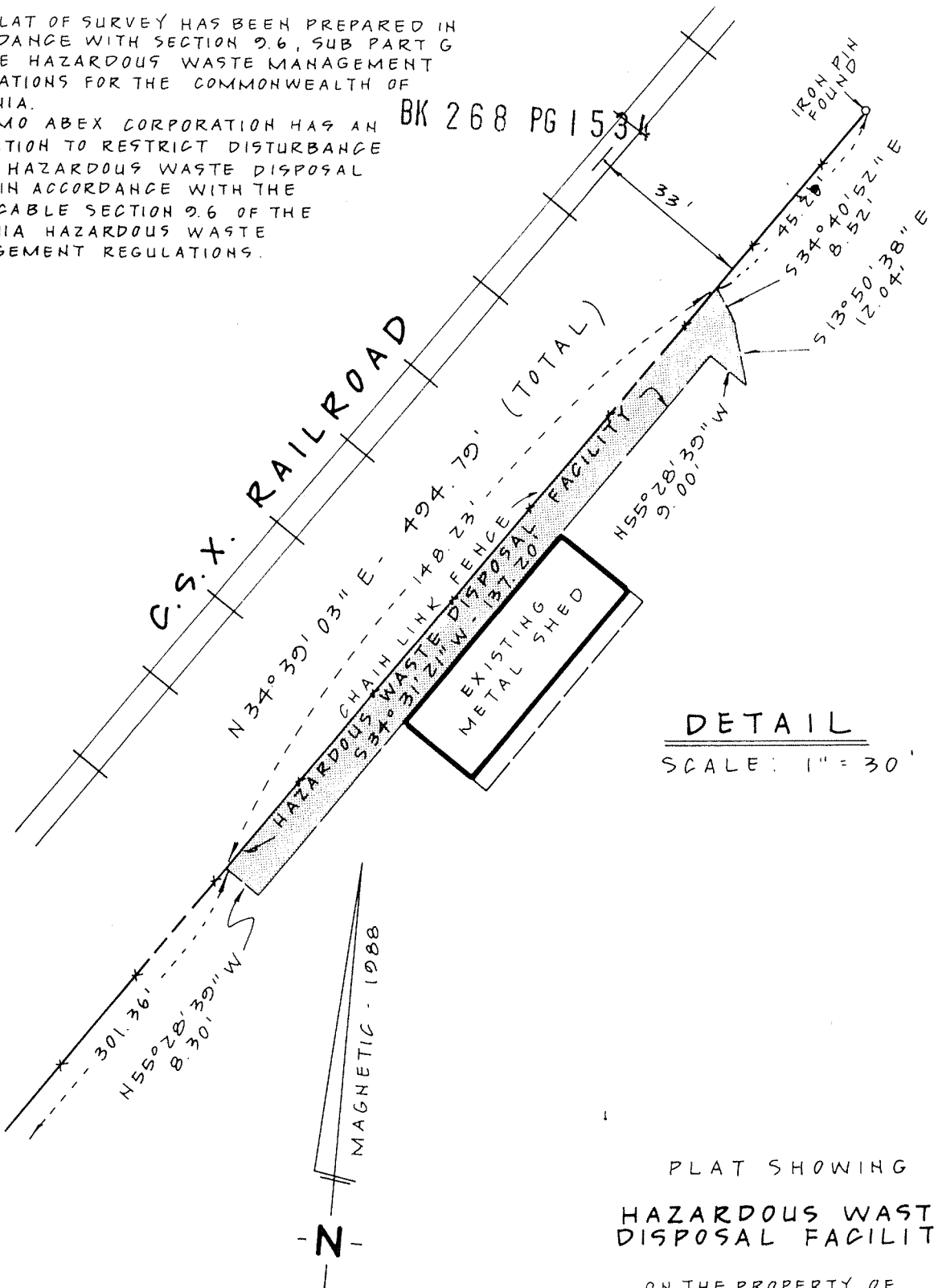


Greenway, Inc.
970 BAKER LANE
WINCHESTER, VIRGINIA 22603
(703) 662-4185

NOTES

1. THIS PLAT OF SURVEY HAS BEEN PREPARED IN ACCORDANCE WITH SECTION 9.6, SUB PART G OF THE HAZARDOUS WASTE MANAGEMENT REGULATIONS FOR THE COMMONWEALTH OF VIRGINIA.
2. PNEUMO ABEX CORPORATION HAS AN OBLIGATION TO RESTRICT DISTURBANCE OF THE HAZARDOUS WASTE DISPOSAL UNIT IN ACCORDANCE WITH THE APPLICABLE SECTION 9.6 OF THE VIRGINIA HAZARDOUS WASTE MANAGEMENT REGULATIONS.

BK 268 PG 1534



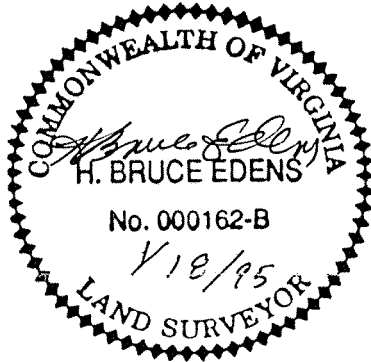
DETAIL
SCALE: 1" = 30'

PLAT SHOWING
HAZARDOUS WASTE
DISPOSAL FACILITY
ON THE PROPERTY OF
**PNEUMO ABEX
CORPORATION**
CITY OF WINCHESTER
VIRGINIA

SCALE: 1" = 30' JANUARY 18, 1995

Greenway, Inc.
970 BAKER LANE
WINCHESTER, VIRGINIA 22603
(703) 662-4185

SHEET 2 OF 2



VIRGINIA, CITY OF WINCHESTER, SCT.
This instrument of writing was produced to me on the 28th
day of February, 1995, at 11:19 AM.
and with certificate of acknowledgment thereto annexed was
admitted to record. Tax imposed by Sec. 58.1-802 of
\$ nme, and 58.1-801 have been paid if assessable.

Deborah A. Payne Deputy Clerk

ATTACHMENT B

FACILITY BACKGROUND, CORRECTIVE ACTION, AND ENVIRONMENTAL HISTORY

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FACILITY BACKGROUND

Federal-Mogul Products US, LLC owns and maintains a formerly operating brake liner production facility at 2410 Papermill Road in Winchester, Virginia (the facility or plant). Federal-Mogul (F-M) purchased the facility in 1998. The site consists of an approximately 400,000 square-foot former Manufacturing Building and several smaller structures on a 40-acre property. The former Manufacturing Building is constructed of concrete block on a concrete slab; the third story is steel-framed with aluminum siding. The building contains former offices, shipping, receiving, storage, and manufacturing areas. The facility is bounded by CSX Railroad property on the west and Pleasant Valley Road on the east.

The physical plant was constructed during World War II on undeveloped land for defense production. After the war in 1947, the Facility refitted it for production of brake liner materials. Abex Corporation owned and operated the Facility from 1947 until 1988. Pneumo-Abex Corporation owned and operated the Facility from 1988 until 1994. Wagner Electric Corporation purchased the Facility in November 1994, and occupied the Facility until October 1998, when F-M purchased Cooper Automotive, which included Wagner Electric. F-M is the current owner and operator of the Facility. Active production activities ceased on March 28, 2013, and Facility activities now consist of maintaining site security and the property in compliance with the current Hazardous Waste Management Permit requirements. Through several changes in ownership, the plant's principle products have been brake linings and disc pads for the heavy truck/automobile industry since production started in 1948. The facility ceased operation on March 28, 2013.

Although the production process remained essentially unchanged, the raw materials were changed in January 1988 such that the waste generated was no longer hazardous. Before 1988, the manufacturing process produced waste that was managed in surface impoundments and an on-site waste pile. The waste generated at the facility before 1988 contained lead and asbestos.

The manufacturing was predominantly a physical process consisting of seven basic operations as described below. Unit containers were manually charged with the raw materials in the form of dry particulates. The initial charge was then transferred to a Lodiges mixer, where it was mixed on a batch basis. The material was pre-formed in molds to the approximate shape of the finished product to facilitate handling. The pre-formed piece was larger in dimension than the finished product. Pressing was performed by a "non-contact steam" press operating at a temperature range of 325° to 450°F. The pressing operation physically reduced the piece thickness to approximately that of the finished product. As dictated by the "formula" requirement, the pressed pieces may have remained in the steam press or been transferred to an oven for final curing. The sides and ends of each piece were sawn or ground to finished dimensions. Approximately 0.030 inches were removed from wear surfaces to attain finished product dimensions. Mounting holes were drilled in each piece. The final product proceeded through printing, packing, and shipping activities for delivery to customers.

Abex, the previous owner, utilized both surface impoundments and waste piles for management of hazardous wastes (EPA waste code D008 for Lead) generated at the Winchester, Virginia facility. Hazardous wastes were generated in the shaping, finishing, and drilling operations. Airborne particulates were continuously removed from work areas by a negative pressure

ventilation system (baghouse) and collected materials were then slurried for transport to the waste surface impoundments where settling occurred and effluent was recirculated back to the slurry system. Airborne particulates were similarly removed from other work areas and collected by eleven wet scrubbers. Aqueous streams from the wet scrubbers were combined with the baghouse slurry prior to entering the impoundments.

The slurry wastewater treatment system consisted of sedimentation to remove solids prior to recycling of the effluent back to the slurry/scrubber system. Sedimentation was accomplished in four surface impoundments. The wastewater treatment system flowed by gravity, into Impoundment #1, then in sequence to Impoundment #2, and Impoundment #3. Supernatant from the settling process was recirculated from Impoundment #3 to the slurry wastewater system. Impoundment #4 was used for any emergency overflow from the other impoundments which was caused by storm water run-on/run-off from the facility. Following certification by the Department of their "clean" closure for soils as discussed below, Impoundments #3 and #4, functioning as a single impoundment, have been used for non-hazardous stormwater as well as occasionally non-contact cooling water from outfall 201; and are located between the closed Impoundments #1 and #2 and the closed Industrial Waste Landfill.

Past lead waste management practices also included a hazardous waste pile. The solids settled in the impoundments and annually, Impoundment #1 was dredged. The dredged solids were placed in an area to the northwest of Impoundment #1 and allowed to dewater for approximately one year. After the dewatering interval, the solids were pushed to an adjacent waste pile for long-term storage/disposal. During the 1960's, some of this waste material was deposited at the northern end of the plant property. A portion of the waste material was later removed and consolidated into the current closed waste pile. This area at the northern end of the property was clean closed and is now part of the permitted industrial solid waste landfill. A closed, permitted solid waste landfill for the non-hazardous waste produced at the plant is located at the north end of the plant property and was in operation from July of 1990 until the closure in October 2014. The other portion of wastes managed in the former waste pile located northwest of Impoundment #1 at the facility were classified as hazardous, based on the characteristic EP Toxicity test for lead (EPA waste code D008). Approximately 5.6 acres of the site are occupied by a hazardous waste pile. Closure of the waste pile as a hazardous waste landfill was certified on September 27, 1984. The Department accepted the closure certification on October 17, 1984.

The wastes managed in the surface impoundments at the facility were classified as hazardous, based on the characteristic EP Toxicity for lead (EPA waste code D008). Approximately 3.5 acres of the site were occupied by Impoundments #1 and #2. Approximately 2.5 acres of the site were occupied by Impoundments #3 and #4 which were "clean" closed with respect to soils; meaning the concentrations of contaminants in soil from the impoundment areas were less than or equal to background concentrations. Closure of Impoundments #1 and #2 as a hazardous waste landfill was certified on February 11, 1991 and clean closure of soils of Impoundments #3 and #4 was certified on November 27, 1990 and December 5, 1989, respectively. The Department accepted the closure certification on May 31, 1991.

Brake lining manufacturing wastes were placed in Impoundments #1 and #2 which were certified for closure on February 11, 1991. Surface Impoundments #3 and #4, were used for settlement of supernatant and possible emergency overflow, and were "clean" closed with respect to soils but not for groundwater. Solids from the wastewater treatment system were dredged from Surface Impoundment #1 and were placed in an area to dewater which was then consolidated into the

current closed waste pile. The Department accepted the closure of the waste pile as a hazardous waste landfill on October 17, 1984. The Department has determined that Federal-Mogul's waste pile and surface impoundments closed as hazardous waste landfills have affected the groundwater quality in the uppermost aquifer beneath the RCRA units in the past.

These above units are monitored as one hazardous waste management area under the compliance monitoring program. In accordance with 40 CFR § 264.96(b), the "compliance period begins when the owner or operator initiates a compliance monitoring program meeting the requirements of § 264.99". Compliance Monitoring was formally initiated with the issuance of the Post-Closure Permit on September 27, 1995. As stated in the Permit, **Permit Condition V.F.3**, the term of the compliance period is equal to twenty-six (26) years from the issuance of the 1995 Post-Closure Permit. The compliance period for the hazardous waste management units is from September 26, 1995 (date of issuance of the initial Permit) to September 26, 2021.

The waste pile used to manage these hazardous wastes (primarily lead) and the associated surface impoundments were closed as RCRA "landfills" in 1984 and in 1991, respectively. The closed landfills are located on the northern portion of the F-M property with an inactive, closed non-hazardous waste landfill. Vegetation covers the ground surface and a fence encloses the RCRA landfills.

The former Print Shop is a smaller building located north and east of the former Manufacturing Building. These are separated by asphalt pavement. The former Print Shop was used until 1977 for part of the brake liner manufacturing process. Then from approximately 1977 to 1982 manufacturing equipment was removed from the Manufacturing Building and stored in the Print Shop. In 1982, the smaller building was converted to a Print Shop with a photographic lab for producing brake product marketing materials. The building reportedly had a satellite hazardous waste storage area beginning in the 1980s. Its use as a Print Shop was discontinued in late 2004. The building is vacant today and was used for limited material (i.e., non-chemical) storage and periodically as a meeting facility.

This resulted in an asbestos containing waste which tested hazardous by Extraction Procedure (EP) toxicity testing for lead. The most recent formulas replaced all asbestos with fiberglass and lead was no longer included as a raw material. Consequently, the waste dust at the facility was tested and was determined to be non-hazardous utilizing the Toxicity Characterization Leaching Procedure (TCLP) test method.

SUMMARY OF ENVIRONMENTAL INVESTIGATIONS AND CLEANUP ACTIVITIES

Based on a review of files maintained by the Department and EPA Region 3, a number of solid waste management units (SWMUs) and Areas of Concern (AOCs) were identified at the Facility. A site layout map is included as **Permit Attachment A, Figure A-1** showing the location of each SWMU and AOC. The following table lists each SWMU and AOC.

Table B-1: SWMUs and AOCs Identification Table

Identification	SWMU/AOC Name
SWMU #1	Former Surface Impoundments #1 & #2
SWMU #2	Former Surface Impoundments #3 & #4
SWMU #3	Former Waste Pile
SWMU #4	Former Slurry Tanks (4 tanks)

Identification	SWMU/AOC Name
SWMU #5	Former Drum Storage Area
SWMU #6	Transfer Stations (one former and one active)
SWMU #7	Former Non-hazardous Industrial Landfill
SWMU #8	Former Non-hazardous Burn Area
SWMU #9	Former Waste Pelletizing
SWMU #10	Former Active (<90 day) Storage Area
SWMU #11	Former Used Metal Storage Area
SWMU #12	Former Waste Conveyance Lines
SWMU #13	Former Satellite Hazardous Waste Storage Areas (<90 day, various locations)
AOC-1	Area around Apex well MW-4
AOC-2	Buried Black Fibrous Material

A RCRA CA remedy for SWMU #5 (the former drum storage area) was approved by EPA Region 3 as part of a modification to the Facility’s Hazardous Waste Management Permit in September 1994. The CA remedy for the SWMU #5 was subsequently incorporated into the Department’s Hazardous Waste Management Permit in 1997 along with site-wide groundwater monitoring requirements. The final remedy elements for SWMU #5 have been implemented and maintained by the facility, and will continue to be required as part of the overall final CA remedy. Details on required maintenance and use-restrictions are provided in the “Summary of Proposed Remedy” Section below.

Based on operating history and records, it was determined by the Department that no further investigation or action was necessary at SWMUs #2, #4, and #6 through #13 in order to meet the goals of the Corrective Action program. SWMUs #1 and #3 are discussed under the RCRA Closure Activities below. Controls for these SWMUs are in place (as required by the Hazardous Waste Management Permit, EPA ID NO. VAD003070976) and will be maintained as part of the overall CA remedy. Below is a summary of the Facility’s closure activities and environmental investigations.

RCRA CLOSURE ACTIVITIES

Before 1988, the manufacturing process produced waste that was managed in surface impoundments and an on-site waste pile. The waste generated at the Facility before 1988 contained lead and asbestos. The former waste pile (SWMU #3) used to manage these hazardous wastes (primarily lead along with asbestos) and the associated surface impoundments #1 and #2 (SWMU #1) were closed as RCRA “landfills” in 1984 and in 1991, respectively. Surface impoundments #3 and #4 (SWMU #2) were clean closed in December 1989 and November 1990, and are currently used for stormwater management.

The closed RCRA landfills are located on the northeastern portion of the F-M property. The closed RCRA units are related to Area of Concern AOC-2; they are adjacent, just north and partially surround the area of AOC-2. (Additional details regarding AOC-2 are provided below under “RCRA Facility Investigation Activities”). Grass vegetation covers the ground surface of the landfills and a fence encloses the closed RCRA units. As stipulated in the Hazardous Waste Management Permit (effective August 30, 2006 through August 30, 2016), compliance monitoring

of certain groundwater monitoring wells is currently completed on a semi-annual basis. In addition, monthly inspections and maintenance checks are performed on the closed RCRA landfills.

RCRA FACILITY INVESTIGATION ACTIVITIES

Investigation results for soil and groundwater at the Facility were initially reported in a Phase II Subsurface Investigation completed by Apex Environmental, Inc. (Apex) in 1995. The findings of this investigation were summarized by Environmental Strategies Consulting LLC (ESC) in their *Site Investigation Report* (February 2005), which led to the identification of the geographical areas that became known as AOC-1 and AOC-2. The 2005 ESC report also detailed the investigation activities performed by ESC from 2002 through 2005 which documented further characterization of the two AOCs at the facility. The delineation of these AOCs was later refined in Environmental Resources Management, Inc. (ERM)'s *Supplemental Investigation Report* (July 2006), along with additional investigation activities conducted from 2007 to 2008 by ERM and reported in *RCRA Interim Measures Design Program: AOC-1* (March 30, 2007) and *Revised AOC-2 Work Plan* (August 14, 2008). In general, the Areas of Concern (AOC-1 and AOC-2) were identified as follows:

AOC-1:

A localized area around Apex monitoring well MW-4 where elevated concentrations of trichloroethylene (TCE) and its breakdown products have been detected in shallow groundwater.

AOC-2:

The presence of buried black fibrous waste material in the vicinity of, but outside the closed, former RCRA waste management units at the facility. The black fibrous waste material includes areas of the property within the fence that encloses the RCRA closed, former waste pile and landfills (later referred to as AOC-2a and AOC-2b), as well as an area just outside of that fence (later referred to as AOC-2c).

A focused site characterization was completed and summarized in the June 11, 2013 *Supplemental Site Characterization Report*. A revised *RCRA Corrective Measures Study for AOC-1 and AOC-2* that evaluated potential corrective measure alternatives for those two AOCs was submitted in July 2015 and approved by the Department on February 11, 2016. More detailed investigation activities and results related to AOC-1 and AOC-2 can be found below.

AOC-1:

During various investigations at the Facility an area of groundwater was discovered that contained elevated concentrations of volatile organic compounds (VOCs), mainly trichloroethene (TCE). The initial investigation in 1995 found elevated levels of TCE in the area around monitoring well MW-4 near the former Print Shop. Groundwater samples from other surrounding wells did not contain concentrations of VOCs above Virginia's Groundwater Protection Standards (GWPS) at that time.

In 2003 and 2004, six additional groundwater monitoring wells (MW-12, MW-13, MW-14, MW-15, MW-16, and MW-17) were installed and tested to evaluate the presence and concentration of certain VOCs believed to be associated with former Facility operations. At these new wells, elevated levels of VOCs (again, mainly TCE) were detected in groundwater samples from one well (MW-16) in 2008. After these analyses, site investigations concluded that the area containing TCE in groundwater appeared to be localized and confined to the weathered bedrock zone in the vicinity

of MW-4. Additionally, the location of MW-4 appeared to reflect a depression in the surface of the bedrock, and as such, the elevated levels of TCE suggest the presence of a “sink” where dissolved TCE has accumulated. The absence of TCE in deeper wells further supported the conclusion that the presence of TCE was limited to the uppermost weathered/fractured bedrock zone, generally encountered from 20 to 35 feet below ground surface.

Supplemental investigation of the groundwater around MW-4 was conducted by ERM in 2006, including sampling and installation of two additional monitoring wells (MW-32 and MW-33). The 2006 data validated the local groundwater conditions and were consistent with results from previous investigations, indicating that the presence of TCE in the groundwater corresponded to a low point in the bedrock surface around MW-4.

Additional investigations have been conducted by ERM since 2008 to support the design and implementation of Interim Measures (IMs) for AOC-1. Injection wells IW-1 through IW-7 were installed in 2008 around MW-4 in preparation for a planned in-situ chemical oxidation (ISCO) IM remediation program. The locations of these oxidant application wells were selected to take advantage of the shallow groundwater flow gradient (i.e., to the east-northeast) to treat the area with the highest total VOC concentrations in groundwater. The wells were screened in water-producing fracture zones of the underlying bedrock. Consistent with the presumed TCE source located by MW-4, elevated TCE concentrations were noted particularly in IW-1 and IW-2, the wells closest to MW-4. An additional application well (IW-8) was later installed in 2009 in an attempt to better delineate the lateral extent of chlorinated solvents in the northwestern direction and to facilitate groundwater treatment in this area. Three groundwater recovery wells and one additional monitoring well were also installed in 2009. The recovery wells (RW-1, RW-2, and RW-3) were installed hydraulically down-gradient of the application wells, while the new monitoring well (MW-34) was installed to monitor groundwater quality downgradient of the ISCO treatment area and recovery wells.

The Facility continues to sample and analyze groundwater on a quarterly basis to monitor and evaluate the effectiveness of the ISCO treatment. Greater detail on these results can be found in the Quarterly Progress Reports submitted by the Facility to the Department. Groundwater monitoring data collected from 2005 to present has shown that VOC constituents have not migrated offsite.

The location of AOC-1 and the groundwater well locations are depicted on **Permit Attachment A, Figure A-1**.

AOC-2:

In 2004, during installation of monitoring wells within the fenced RCRA area, a black, fibrous material was observed in the borings. The material sampled from the borings contained between 5 and 7 percent chrysotile asbestos. Boring log descriptions (e.g., black silt, dark potentially charred material, and black mottling) from the Apex 1995 investigation indicated that suspect anthropogenic materials were observed at several other soil boring locations within the RCRA area. Because the black fibrous material was encountered at a location within the delineated RCRA area, further investigation was conducted to delineate the distribution of this material.

The ESC 2005 *Site Investigation Report* documented the presence of black fibrous waste material at site locations immediately outside of the closed RCRA landfills. In 2006, ERM performed a supplemental investigation that delineated the lateral extent of the black fibrous waste material. The identified fibrous waste areas included:

- a. Within the grassed area north and west of the former pelletizer room;
- b. Beneath the asphalt driveway (located between the northeast wall of the former Manufacturing Building and south of the closed RCRA unit fence); and
- c. Between the closed waste impoundments and the closed waste pile (the closed RCRA sites) and extending south to the RCRA fence and the asphalt pavement west of the former Print Shop.

Test results from waste material sampling indicated that the black fibrous waste material contains, at certain locations, asbestos at greater than one percent, and lead at concentrations that exceeded regulatory limits.

To provide the most effective remediation of the area where waste was identified outside of what was believed to be the closed RCRA landfill units; AOC-2 was divided into three areas because of the different characteristics of each area. AOC-2 is shown on Figure 1 and descriptions of each area are provided below:

AOC-2a:

AOC-2a is an approximately two acre area. The existing compacted clay cap located in the area was determined to be similar to that of the existing closed waste pile. This cap met the objectives set forth in the 1984 Waste Pile Closure Plan; therefore, no further corrective measures were warranted by the available information beyond the Permit-required post-closure care consisting of groundwater monitoring, inspection, and maintenance.

AOC-2b:

AOC-2b is an approximately one-fourth acre area inside the fence that encloses the RCRA closed landfills. Site investigations determined that the cap in this area did not meet the specifications described in the 1984 Waste Pile Closure Plan. The Waste Pile Closure Plan called for a cap consisting of two and one-half feet of compacted clay overlain by six inches of topsoil; Site investigations discovered the thickness of the barrier over waste within AOC-2b ranged between 0.9 and 1.9 feet based on soil borings conducted by ESC and ERM. It is thought that the 1984 closure activities may have intentionally covered this area with less clay and/or topsoil to address slope, drainage, and erosion concerns as the area provides drainage for areas up-gradient of the on-site surface water ponds via a shallow swale.

AOC-2c:

AOC-2c is an approximately one-half acre area outside of the RCRA fence that contains similar buried waste material that was covered by both asphalt pavement and grass. The asphalt paved portion of this area had active vehicular traffic from facility operational activities. AOC-2c is now covered with a supplemental cap and asphalt pavement as described below under "Interim Measures".

INTERIM MEASURES

Interim Measures were conducted for AOC-1 and AOC-2 under RCRA policy to stabilize and mitigate threats to human health and the environment in an accelerated manner. Detailed work plans were prepared and submitted to the Department for review, comment, and ultimate approval. Subsequently, IM Work Plans and Design Programs were prepared by ERM and approved by the Department for each AOC. A summary of the IMs conducted is presented below.

AOC-1:

To address AOC-1, the application of ISCO utilizing sodium permanganate as an oxidant in the area of MW-4, was selected as an IM remedial design. This remedial technology is well-documented in its effectiveness and was selected because it will further mitigate the potential for groundwater with VOC concentrations above GWPS to migrate off-site. The ISCO application with permanganate was designed to fully mineralize the TCE to carbon dioxide and salt (chloride, Cl⁻). Several treatability studies were conducted leading up to the implementation of the ISCO remediation system, including natural oxidant demand (NOD), a dye trace study, a geophysical study to determine shallow-bedrock fracture orientation, and aquifer testing, to ensure effective contact between the reagent and TCE source area to maximize the oxidation reaction in the source area and the effectiveness of the ISCO application.

The original ISCO application system that was designed for the Facility was a “recirculating” system whereby extracted groundwater was amended with sodium permanganate and returned to the aquifer hydraulically up-gradient of the treatment area. In this manner, the extracted groundwater served two primary purposes:

- a. Create a dilute oxidant solution for application, eliminating the need to add excess water to the site that could potentially impact the existing hydraulic conditions; and
- b. Provide advection of the injected fluid to facilitate flushing (desorption and treatment) within the affected treatment zone using the oxidant solution.

At the conclusion of each application event, the ISCO system was flushed with un-amended groundwater and drained. The system remained in place for potential additional application events. The necessity of additional application events was determined following a review of the data from each post application event groundwater sampling. Two ISCO application events have taken place using the recirculation method and system. The first application was conducted from 2009 to 2010 and the second application was conducted in 2011. The above-ground application equipment (i.e. mixing tank) was removed from the Facility in 2014 since a subsequent ISCO application performed in 2015 used mobile application equipment and the fixed tank was no longer needed.

Upon review of site groundwater data, two areas up-gradient of the initial ISCO application area which were not treated by the initial IM remedial design were identified and included as part of the ISCO application program:

- a. The area to the west around MW-16 and MW-33;
- b. The MW-12 area, directly south and up-gradient of the MW-4 well area.

ERM proposed a focused site characterization in the area of MW-16 and 33, as well as in the area of MW-12 to facilitate effective ISCO application in these areas. This supplemental site characterization work was approved by the Department on February 7, 2013. Soil sampling and groundwater well installation (MW-101 through MW-113) and sampling were conducted in 2013. The characterization results were summarized in the June 12, 2013 *Supplemental Site Characterization Report*. Based upon the results of the focused site characterization and prior ISCO application events, an ISCO groundwater remediation application (the third application) was recommended to target the MW-16, MW-33, and MW-12 areas. The third ISCO application using a low-pressure, mobile application process was completed during the period of April 6, 2015 to May 5, 2015.

Groundwater monitoring continues to be conducted to monitor the results of the ISCO applications.

AOC-2:

To address AOC-2, an IM remedial design was selected involving installation of a RCRA-equivalent cap at AOC-2b and 2c. The caps were designed to achieve compliance with the RCRA Cap Equivalency Standards.

AOC-2b:

For AOC-2b, the supplemental cap utilized the existing compacted clay that is present above the waste materials as the base low permeability soil layer and a supplemental cap approved by the Department. The supplemental cap was constructed of the following:

- a. 40-mil smooth high-density polyethylene (HDPE) geomembrane;
- b. 200-mil double-sided geocomposite with 10 oz/yd² non-woven geotextile; and
- c. Minimum 10-inches of soil seeded with grass and other vegetative ground cover.

AOC-2c:

The AOC-2c supplemental cap consisted of the following elements as approved by the Department:

- a. 7.5 oz/yd² non-woven geotextile;
- b. 40-mil smooth HDPE geomembrane;
- c. 200-mil double sided geocomposite with 10 oz/yd² non-woven geotextile;
- d. 3.8 oz/yd² non-woven orange geotextile (warning layer);
- e. Subsurface warning tape with continuous wording as follows: "Hazardous Waste – Do Not Enter" at five foot intervals;
- f. Minimum six inches of VDOT No. 21-A dense graded aggregate as the asphalt sub-base;
- g. Four inches of base course asphalt (VDOT BM-25.0); and
- h. Two inches of wearing course asphalt (VDOT SM-9.0A).

The Department approved the IM design for AOC-2b and AOC-2c on September 9, 2008. Installation of the supplemental caps at AOC-2b and AOC-2c was conducted during October to November 2009 by ERM contractors, EWMI and Chenango Contracting, a specialty geosynthetic liner installation firm.

Subsequent to the completion of those installation activities, AOC-2b and AOC-2c were surveyed, along with the entire RCRA closed landfill area inside the fence (including AOC-2a). Additionally, as part of the AOC-2 IM, a deed restriction was recorded with the City of Winchester on January 23, 2012 for AOC-2b and AOC-2c to amend the existing deed restriction information for the previously closed RCRA surface impoundments and waste pile. The deed restriction restricts subsurface disturbance within the boundaries of these areas without prior notification and approval of the Department.

CURRENT CONDITIONS

AOC-1

Currently, the contaminated groundwater area at issue, which primarily consists of TCE and breakdown products, is contained onsite and is limited to the uppermost weathered/fractured

bedrock zone in a localized area. The TCE and breakdown products are present in the vicinity of MW-4, near the Print Shop. TCE is present above the GWPS in seven groundwater wells within approximately 150 feet of MW-4. The highest concentration of TCE is currently found at MW-33 and MW-4. Figure 2 shows the location of groundwater monitoring wells. The facility is continuing interim measure activities for AOC-1 by monitoring concentrations of Constituents of Concern (COCs), including TCE and its breakdown products and other chlorinated and non-chlorinated VOCs in groundwater on a quarterly basis. Analytical data are submitted to the Department in routine progress reports.

AOC-2, SWMU #1, SWMU #3, SWMU #5

The Facility currently conducts semiannual groundwater compliance monitoring for the closed RCRA landfills (SWMU #1 and #3) in accordance with the requirements of the Hazardous Waste Management Permit. Groundwater monitoring results are routinely reported to the Department and the results currently show parameters are below applicable Permit limits or have alternate source demonstrations approved by the Department. The vegetative cover on the closed RCRA landfills and AOC-2b is routinely inspected and maintained to ensure its integrity. Site personnel continue to monitor site security, including the existing perimeter fencing. A pest management contractor is utilized to manage any rodents in the closed RCRA landfill area on a seasonal basis. In addition, site personnel perform monthly inspections of SWMU #5, including integrity of the asphalt cap, as required by the Facility's Hazardous Waste Management Permit.

CORRECTIVE ACTION OBJECTIVES

Closed RCRA Landfills and SWMU #5

The Department has determined that industrial risk-based levels are protective of human health and the environment for individual contaminants at this Facility provided that the closed RCRA landfills and SWMU #5 areas are not used for residential purposes. Deed restrictions prohibiting residential use have been imposed by the Hazardous Waste Management Permit. Accordingly, the Department's Corrective Action Objectives for these Facility areas are the following:

- a. To control exposure to the hazardous constituents remaining in place by requiring compliance with and maintenance of land use restrictions at the Facility. This restriction is imposed by the Facility's Permit; and
- b. To prevent infiltration of stormwater and control exposure to the hazardous constituents remaining in place in the closed RCRA landfills and SWMU #5 by requiring existing RCRA caps and asphalt covers to be maintained at the Facility. This restriction is imposed by the Facility's Permit

Groundwater

The Department has determined that drinking water standards, namely Maximum Contaminant Levels (MCLs) or risk-based Alternate Concentration Limits (ACLs) for constituents that do not have an MCL, for COCs in groundwater at the Facility are protective of human health and the environment. The Department's Corrective Action Objectives for Facility groundwater are the following:

- a. To control exposure to the hazardous constituents in the groundwater by requiring compliance with and maintenance of a groundwater use restriction at the Facility as long

- as drinking water standards are exceeded. This restriction will be imposed by the Facility's Permit;
- b. To remediate groundwater using in-situ chemical oxidation (ISCO) technology or other groundwater remediation technology approved by the Department; and
 - c. To monitor stability and/or attenuation of concentrations of the hazardous constituents in groundwater until Remedial Targets are met (see **Permit Attachment G**).

Indoor Air

The Department's Corrective Action Objective for indoor air is to control exposure to volatile hazardous constituents in indoor air by requiring the use of vapor mitigation in or beneath existing and any newly constructed totally enclosed structures designed for occupation within 100 feet of the foot print of groundwater having site-related VOCs and SVOCs identified above protective levels (MCLs/ACLs), unless it is demonstrated to the Department that vapor mitigation is not necessary to protect human health. For existing building(s) that are designed for occupation but are not currently occupied (i.e. vacant), the need for vapor intrusion mitigation measures shall be assessed should the use of such building(s) be modified from its current use in such a manner that vapor intrusion could reasonably become an unacceptable human health risk. The method of assessment will be based on current Department and/or EPA risk assessment guidance. This requirement will be imposed by the Facility's Permit.

ATTACHMENT C

POST-CLOSURE CARE PLAN: SURFACE IMPOUNDMENTS 1 AND 2, AND WASTEPILE CLOSED AS HAZARDOUS WASTE LANDFILLS

ATTACHMENT C

POST-CLOSURE CARE PLAN: CLOSED SURFACE IMPOUNDMENTS AND WASTEPILE CLOSED AS HAZARDOUS WASTE LANDFILLS

INTRODUCTION

Post-Closure Care

Post-closure care shall continue for 30 years after certification of closure (February 11, 1991) and consists of monitoring and reporting in accordance with the requirements of 40 CFR § 264 and in the Permit.

- a. Monitoring and reporting in accordance with the requirements of 40 CFR § 264 Subpart F and this Permit.
- b. Maintenance and monitoring of the two (2) surface impoundments and waste pile closed as a landfill in accordance with the requirements of 40 CFR § 264.110 and 40 CFR § 264.310.

Property Use

Use of the property subject to this post-closure care plan shall never, during the post-closure care period, be allowed to disturb the integrity or the function of the facility's monitoring system unless the Owner/Operator demonstrates to the Director that the disturbance:

- a. Is necessary to the proposed use of the property and will not increase the potential hazard to human health or the environment; or
- b. Is necessary to reduce the threat to human health or the environment. Such use will require the written permission of the Director prior to implementation.

List of Known Solid Waste management Units (SWMUs), Hazardous Waste Management Units (HWMUs) and Areas of Concern (AOCs)

The list of solid waste management units (SWMUs) and areas of concern (AOCs) for the Federal-Mogul Products US, LLC, Winchester site (EPA ID No.VAD003070976) is identified in **Permit Attachment A** and **Permit Attachment B**. The list of SWMUs and AOCs is based upon a Post Closure Care Permit Application (PCCP) dated March 22, 2005. The status and actions required were updated in 2016 upon permit renewal.

Table C-1: Summary of SWMU & AOC Status

SWMU or AOC #	Description	Status	Actions Required
SWMU # 1	Former Surface Impoundments #1 & #2	Closure as a landfill certified February 11, 1991. ⁽¹⁾	None
SWMU #2	Surface Impoundments #3 & #4	Clean Closure certified December 1989 (#4) ⁽²⁾ and November 1990 (#3). ⁽³⁾	None

SWMU or AOC #	Description	Status	Actions Required
SWMU #3	Former Waste Pile	Closure as a landfill certified February 11, 1991. ⁽⁴⁾	None
SWMU #4	Former Slurry Tanks (4 tanks)	Removed and disposed of off-site ⁽⁵⁾	None
SWMU #5	Former Drum Storage Area	Asphalt cap closure approved by the DEQ. ⁽⁶⁾⁽⁷⁾	Quarterly visual inspections of asphalt cap, per permit modification of 9/21/1994
SWMU #6	Transfer Stations (one former; one current)	Current station used for conveying leachate from non-hazardous landfill to the sanitary sewer. No evidence of any release from this unit. ⁽⁵⁾ Former transfer station used to transfer supernatant from the impoundments back to the slurry tanks (SWMU #4) were demolished.	None.
SWMU #7	Former Industrial Landfill	Inactive landfill previously used for disposal of non-hazardous process waste. Subject to Solid Waste Permit #527.	Ongoing Permit Compliance [Permit no. 527]
SWMU #8	Former Burn Area	Primarily located beneath the former production building. ⁽⁸⁾	None
SWMU #9	Former Waste Pelletizing	Previously used to pelletize non-hazardous waste dust to facilitate handling prior to landfill disposal. ⁽⁸⁾	None
SWMU 10	Former Active (<90 day) Storage Area	Previously used for hazardous waste storage in the plant. ⁽⁸⁾	None. Ongoing regulatory compliance
SWMU 11	Former Used Metal Storage Area	Previously used for storage of used metal prior to reuse or salvage. ⁽⁸⁾	None. Ongoing regulatory compliance.
SWMU 12	Former Waste Conveyance Lines	Out of use except for the leachate line from the non-hazardous landfill. ⁽⁸⁾	None. Ongoing regulatory compliance

SWMU or AOC #	Description	Status	Actions Required
SWMU 13	Former Satellite Hazardous Waste Storage Areas (<90 day, various locations)	Previously used for satellite storage of hazardous waste. ⁽⁸⁾	None. Ongoing regulatory compliance
AOC #1	Area Around Apex Well MW-4	Contamination of groundwater undergoing remediation as part of Corrective Action Interim Measures. ⁽⁹⁾	Groundwater monitoring and remediation per Corrective Measures Study
AOC #2	Buried Black Fibrous Material	Fibrous material located under soil and/or asphalt adjacent to the north side of the former production building. ⁽⁸⁾	Site inspection and maintenance per Corrective Measure Study

February 11, 1991 letter from Olver Incorporated to the Virginia Department of Waste Management.
 December 5, 1989 letter from Olver Incorporated to the Virginia Department of Waste Management.
 November 27, 1990 letter from Olver Incorporated to the Virginia Department of Waste Management.
 August 24, 1984 letter from Olver Incorporated to the Virginia Department of Health.
 May 1, 1998 letter from the Virginia Department of Environmental Quality to the US EPA Region III.
 March 1994 letter from the Virginia Department of Environmental Quality to Abex Friction Products.
 September 21, 1994 Final Permit Modification for Corrective Action and Waste Minimization for Abex Friction Products.
 February 18, 2005 Environmental Strategies Consulting (ESC) Site Investigation Report.
 June 2015 RCRA Corrective Measures Study for AOC-1 and AOC-2, Environmental Resources Management

Identification of Hazardous Constituents

List of Wastes: Surface Impoundments and Waste Pile Closed As Hazardous Waste Landfills Known Hazardous Waste Placed

Lead (D008) is the only known hazardous waste place in the surface impoundments and waste pile closed as hazardous waste landfills at Federal-Mogul Products US, LLC, (Formerly Wagner Electric Corporation-Abex Friction Products).

Suspected to Have Been Managed – Hazardous Waste

The following is comprised of but not limited to, all known hazardous waste constituents (as defined by VHWMR 9 VAC 20-80-264.13) which have been or are suspected to have been managed in the surface impoundments and waste pile closed as hazardous waste landfills at Federal-Mogul Products US, LLC, (Formerly Wagner Electric Corporation-Abex Friction Products) in Winchester, Virginia.

Table C-2: List of Hazardous Constituents

Constituents	
Antimony	Vanadium
Arsenic	Zinc
Barium	Bis (2-ethylhexyl)phthalate
Beryllium	Chlorobenzene
Cadmium	Chloroethane

Constituents	
Chromium	Chloroform
Cobalt	1,1-Dichloroethane
Copper	trans-1,2-Dichloroethylene
Lead	Formaldehyde
Mercury	Phenol
Nickel	Toluene
Selenium	1,1,1-Trichloroethane
Silver	Trichloroethylene
Thallium	Vinyl Chloride
Tin	

INSPECTION AND MAINTENANCE PLAN

Security

Post Closure security shall be maintained by the use of the existing fences and gates which completely surround the perimeter of the Federal-Mogul Products US, LLC, facility. All gates providing access to the hazardous waste facility will be locked at all times, except when there is a need for on-site personnel or authorized visitors to access the area. At all times, plant personnel will visually inspect all personnel and visitors who gain access to the site. Access to waste management area will be refused to members of the public and domestic livestock.

Maintenance Requirements

Vegetation
 A complete stand of vegetation shall be maintained on the entire vegetation layer throughout the post-closure care period. The vegetation layer shall be limed and fertilized as needed. Mowing shall be performed at least 3 times yearly or more frequently as needed. Approved herbicides and insecticides shall be applied as needed to control noxious invading species. Irrigation shall be performed as needed during excessive dry spells.

Cap/Cover

The original configuration of the previously closed RCRA units shall be maintained throughout the entire post-closure care period (**Permit Attachment C, Appendix C-1**). Within 30 days of the detection of significant subsidence or erosion, repair work shall be accomplished to bring the lines and grades back to at least their original configuration and restoring the barrier layer, if necessary, to maintain a positive slope. Significant subsidence or erosion shall be defined as any cover from its original intended design performance of the cover from its original intended design performance. Erosional features with the depth of two inches will be considered "significant" due to the final cover design. Soils, materials, and repair work shall meet minimum standards set forth in the closure cover design. (**Permit Attachment C, Appendix C-2**).

Drainage

Site drainage shall be maintained as designed in the closure plan. Swales and gullies shall be maintained, repaired, and kept free of debris and brush as necessary to provide the appropriate slope. Appropriate maintenance and repair shall be accomplished to ensure drainage is directed towards the outfall or retention structure as indicated in the approved closure plan.

Benchmarks

Benchmarks were installed to act as points of reference for locating the monitoring wells and determining the groundwater potentiometric surface. Benchmarks were installed by a certified land surveyor. Their location and elevation are tied into the property boundary and are recorded in the deed to the property. The location and elevation of the benchmarks shall be determined annually and any changes noted in the log book.

Groundwater Monitoring Wells

Monitoring well locking caps shall be locked at all times except when the monitoring wells are being sampled or maintained (**Permit Attachment E, Appendix E-5**).

INSPECTION REQUIREMENTS AND SCHEDULE

In accordance with 40 CFR § 264.15, the Permittee is to follow a written inspection schedule observing malfunction, deterioration, or operational errors in the monitoring systems for the waste management units; implement remedial action when necessary; and maintain a signed and dated inspection log at the facility and available to the Department upon request which provides inspection observations, deficiencies noted, and corrective action taken.

Weekly Inspection

Security

The Permittee shall inspect the facility weekly for the physical condition of the fences and gates.

Monthly Inspections

Drainage

The Permittee shall inspect monthly for deterioration, malfunction, or improper operation of landfill and immediate area run-off and run-on control systems (i.e., benched slopes, swales and gullies, outfall or retention structures, let-down structures, diversion ditches).

Cap/Cover

The Permittee shall inspect monthly for structural deformity or deterioration of final cover as evidenced by ponded rain water, rodent and vector activity, deep rooted vegetation, leachate seeps, unauthorized vegetation, food-chain crops, vegetative stress, water or wind erosion, potholes, cracks, slumps, subsidence, etc.

Annual Inspections

Groundwater Monitoring Wells

The Permittee shall inspect annually for damage to groundwater monitoring wells and piezometers (i.e., unlocked protective cover, unsecured protective casing, damaged well and/or defective concrete pad) and unsatisfactory performance or operational deficiencies of the wells and piezometers (obstructions, bends, excess sediment accumulation, grout erosion, inadequate yield, etc.). Protective concrete aprons shall be inspected for subsidence and breakage. Monitoring wells shall be replaced or repaired as necessary.

Benchmarks

The Permittee shall inspect annually for defective or disturbed benchmarks, note changes and maintained as necessary to sustain their intended use. If the benchmarks have been disturbed, then the benchmarks shall be resurveyed.

Inspection Records

- a. All inspections shall be logged and detailed inspection reports written.
- b. Current logged reports of each inspection shall be maintained at the facility during the entire post-closure care period.
- c. The inspection results and groundwater sampling and analysis results shall be available at the facility for the Department of Environmental Quality representatives during periodic on-site inspections of the facility. Examples of Inspection Logs for annual inspections are included in **Permit Attachment C, Appendix C-3 and C-4.**

FACILITY CONTACT

The facility copy of the Post-Closure Plan is maintained in the facility files at the Federal- Mogul site in Winchester, Virginia. Mr. Mason is responsible for storage and updating of the Post-Closure Plan during the post-closure period.

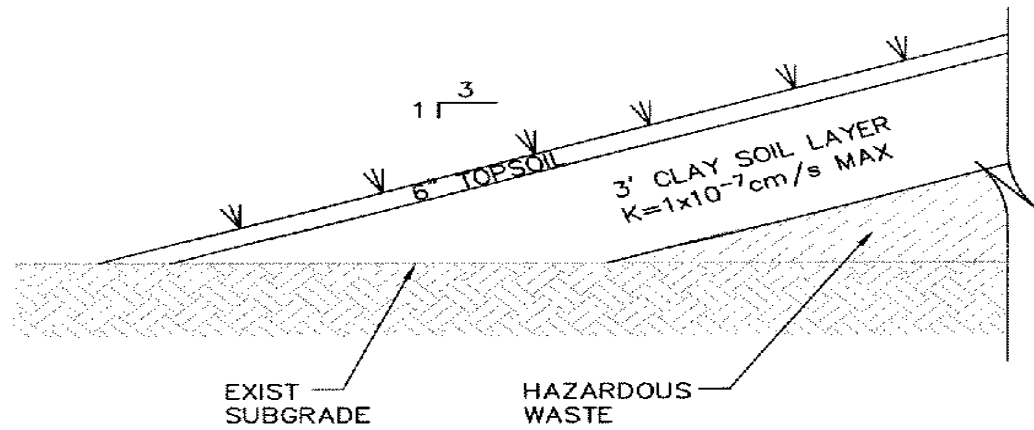
The post-closure care contact representative for the Federal-Mogul site is noted below:

Facility Contact:

Mr. Stoney Mason
Plant Manager
Federal-Mogul Products US, LLC
2410 Papermill Road
P.O. Box 3250
Winchester, Virginia 22604

APPENDIX C-1

Final Cover Schematic – Waste Pile



**FEDERAL-MOGUL PRODUCTS, WINCHESTER VA
WASTE PILE CLOSED AS A HAZARDOUS WASTE LANDFILL
FINAL COVER SCHEMATIC**

SCALE: NO SCALE
JOB NO.: 1413.12

6/21/06

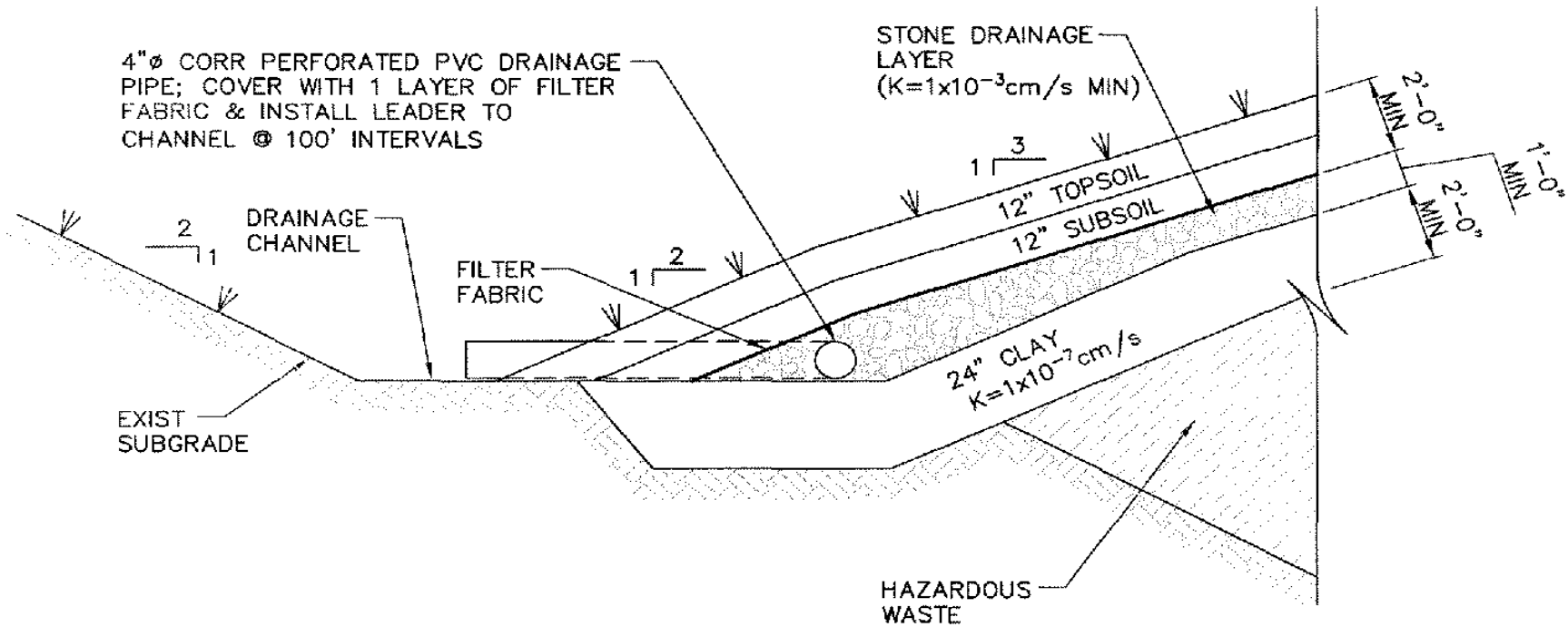


E:\DWG\FEDMOC\1413.12\FINAL COVER SCHEMATIC.dwg, 8.5x11 L, 6/21/2006 4:52:15 PM, cad

APPENDIX C-2

Final Cover Schematic – Surface Impoundments #1 & #2

I:\Dwg\IEDHOG11413.12\FINAL COVER SCHEMATIC.C-2.5HWG-3.5X11.L 6/21/2006 4:58:47 PM, cad



FEDERAL-MOGUL PRODUCTS, WINCHESTER VA
SURFACE IMPOUNDMENTS #1 AND #2 CLOSED AS A HAZARDOUS WASTE LANDFILL
FINAL COVER SCHEMATIC

SCALE: NO SCALE
JOB NO.: 11413.12

6/21/06



APPENDIX C-3

EXAMPLE ANNUAL INSPECTION LOG

Note: a separate inspection sheet is required for each monitoring well.

<u>MONITORING WELL:</u>	
A. Inspected by (full name):	
B. Date/Time of Inspection:	
C. Inspection Observations:	
C. 1 Locking protective casing:	
C. 2 Concrete well Pad:	
C. 5 Exterior well identification number:	
D. Inspection Comments:	
E. Repair/remediation Comments:	
F. Repair/remediation Date:	

APPENDIX C-4

EXAMPLE ANNUAL INSPECTION LOG

<u>ANNUAL INSPECTION-BENCHMARK VERIFICATION</u>	
A. Inspected by (full name):	
B. Date/Time:	
C. Inspection Observations:	
D. Determine location of all benchmarks and note changes:	
E. Attach results of benchmark survey.	
F. Repair/Remediation Comments:	
G. Repair/Remediation Date:	

ATTACHMENT D
PERSONNEL TRAINING

ATTACHMENT D
PERSONNEL TRAINING

TRAINING

Training Requirements

Appropriate training shall be completed by all persons at Federal-Mogul Products US, LLC and/or their consultants who are or who may be involved in the task associated with hazardous waste post-closure care activity. The Permittee shall insure that those individuals responsible for groundwater monitoring, inspections, and repair are appropriately trained.

Training for New Employees

New employees who have as part of their job responsibility tasks which are associated or may be associated with the post-closure care activity shall not work unsupervised until the training requirements in accordance with this Permit are completed. Such new employees shall complete required training within six months of their employment date.

Training Documentation

All training of Federal-Mogul personnel shall be documented at the time of each completed session and such documentation shall be maintained in the facility files in the operating log for at least three years from the date on which the training was completed. Such documentation shall include the name of each trainee and trainer, date of instruction, and a summary or outline of the training session.

Training Frequency

All training under this Permit shall be reviewed at least annually and updated as necessary. All personnel who are subject to the training requirements under this Permit shall be required to review their training at least annually.

Training for Assigned Duties

In general, all personnel who are actively associated or may be associated with the proper inspection and maintenance of the monitoring wells and the proper operation of the monitoring wells are required to read the Permittee's Post-closure Plan and/or Sampling and Analysis Procedures as appropriate.

REQUIRED INSPECTIONS

The personnel shall be trained to properly perform their assigned duties including, but not limited to, conducting inspections required by **Permit Attachment C**, obtaining samples from groundwater monitoring wells and maintaining documentation in accordance with the requirement of this Permit.

INSTRUCTION

The personnel noted above shall be required under this Permit to fully understand the techniques of proper maintenance and operation and maintain appropriate documentation required under this Permit.

Role of Supervisory Personnel and Training

Supervisory staff shall be trained to review and to provide appropriate guidance and/or liaison with the Permittee's management. The Permittee shall provide sufficient opportunity for personnel to acquire a full understanding of maintenance and operation techniques by providing sufficient instruction and/or sponsoring sufficient instruction by professionals who are qualified to provide such instruction.

Training for Personnel Exposed to Hazards

All personnel who are or may be exposed to the hazards associated with the post-closure care activity shall receive the appropriate training and shall utilize the appropriate personnel training as specified by the Occupational Safety and Health Act (OSHA) requirements in 29 CFR § 1910.120.

Training for Personnel Involved in Post-Closure Care

The personnel involved in the actual post-closure care activity, specifically the groundwater monitoring wells, within the scope of this Permit will be trained in the proper management procedures for spent monitoring well sample effluent (i.e., purge water, decontamination fluids) and the Sampling and Analysis Plan and Groundwater Monitoring Program required by the Permit and **Permit Attachment E**. These procedures will ensure continued safe operation and maintenance and compliance with applicable environmental regulations.

Responsibility for Training

The facility contact or his designate will be responsible for the overall training program, scheduling, and documentation of such training and shall serve as the Post-Closure Care Training Director. He shall ensure that all sub-contractors are trained in accordance with OSHA (29 CFR § 1910.120).

Required Training for All Personnel

All personnel required under this Permit to receive training shall at minimum be instructed in the following areas:

- a. Area specific management practices regarding post-closure care activities.
- b. Security and safety.
- c. General and area specific inspections and record keeping.
- d. Regulatory updates which affect operations and activities.
- e. Job function and procedural descriptions of each employee's respective role in post-closure care.

JOB DESCRIPTION SUMMARY

Facility Contact

The facility contact oversees the monitoring wells, unit cap and security fence safety, and inspection and maintenance programs. Has record keeping responsibilities, retains Hazardous Waste Management Facility Permit and inspection checklists and/or logs and assures that all inspection and maintenance schedules are in accordance with **Permit Attachment C**.

Monitoring Well Samples

Follows sampling protocol as described in **Permit Attachment E**. Collects samples and decontaminates equipment. Stabilizes samples and provides transport to appropriate laboratory

facility for analysis. Transports and disposes of purge or decontamination water at the on-site wastewater treatment facility if available, or a permitted treatment facility with approval.

- a. Checks wells for structural integrity and security.
- b. Redevelops monitoring wells when necessary.
- c. Maintains accurate and detailed records/logs of observations and remediation if required in accordance with **Permit Attachment C**.

Annual Training

Annual training will include but is not limited to:

- a. OSHA 8-hour Refresher
- b. OSHA and Employee's Workplace Rights
- c. Hazard Communication
- d. Health Awareness and Evaluation
- e. Health Effects of Chemicals: Characteristics of Hazardous Chemicals-Toxic Properties of Hazardous Chemicals
- f. Medical Surveillance Requirements
- g. Fire Protection and Safety
- h. Air Monitoring and Equipment
- i. Decontamination Procedures
- j. Site Control
- k. Sampling Techniques and Procedures

ATTACHMENT E

GROUNDWATER MONITORING PROGRAM, SAMPLING AND ANALYSIS PLAN

ATTACHMENT E

GROUNDWATER MONITORING PROGRAM, SAMPLING AND ANALYSIS PLAN

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I. SAMPLING

I.A Introduction

Federal regulations at 40 CFR § 270.14(c)(5), 270.14(c)(6)(iv), and 270.14(c)(7)(vi) require a description of the sampling, analysis, and statistical comparison procedures proposed for evaluating groundwater monitoring data. In addition, 40 CFR § 264.97(d) and 264.97(e) outline minimum procedures and techniques for groundwater monitoring programs implemented pursuant to 40 CFR §264 Subpart F. These regulations require that groundwater monitoring programs include measurement, sampling, and analytical methods that accurately assess groundwater quality, and that provide early detection of hazardous constituents released to groundwater.

The groundwater in the uppermost aquifer beneath the closed hazardous waste landfills will be monitored annually with one up-gradient monitoring well and down-gradient compliance point monitoring wells location were determined under the guidance of approval of the Department. Monitoring well MW-7 is the background well.

I.B Sampling Frequency

Background and point of compliance wells will be sampled annually for the constituents in **Permit Attachment F**.

I.C Field Methods

The following activities should be performed prior to collecting ground-water samples for analysis:

- a. Measurement of static water level elevation;
- b. Detection and sampling of immiscible layers and
- c. Well purging.

I.C.2 Measurement of Static Water Level Elevations

Prior to purging each well, both the static water level (SWL) and the depth to the bottom of the well shall be measured to ± 0.01 foot (depth to bottom of the well is not required for dedicated pumps). Well measurements will be made using an electronic water level probe, referenced to a predetermined mark at the top of the well casing. The elevation of the top of the well casing (with locking cap removed) will be established to an elevation 0.01 foot, in relation to the existing landfill datum, which will be established from a National Geodetic Vertical Datum.

The static ground water surface elevations obtained prior to each sampling event shall be used to create potentiometric maps to determine whether the requirements for locating the monitoring wells continues to be satisfied. If the potentiometric maps reveal that the depths, location, or number of wells is insufficient to monitor hazardous waste constituents migrating from the waste management area, new well locations and depths will be submitted to the Department for their approval and subsequent installation and monitoring. Any new wells will be installed prior to the next regularly scheduled groundwater sampling event.

Up-gradient wells and wells where constituents have not historically been noted will be measured first, followed by wells where constituents have been noted. All measurements

for each well will be recorded in the Groundwater Log. Measurements that do not correlate with the previous trends will be verified in the field with different measurement technology, if necessary.

I.C.3 Calculation of Static Water Volume

The static water level and total depth will be used to calculate the volume of stagnant water in the well and provide a check on the integrity of the well (e.g., identify siltation problems), as well as characterize changes in hydraulic conditions that may occur over time. The static water level measuring device used will be constructed of inert materials and thoroughly decontaminated prior to each use to prevent cross contamination from one well to another. The meter will be decontaminated by washing with non-phosphate detergent and rinsing three times with de-ionized water prior to air-drying. Decontamination fluid will be containerized and disposed of in an on-site wastewater treatment system if available or a publicly owned treatment facility with approval. Sampling members will wear clean gloves during sampling and shall change gloves between sampling each well at a minimum.

I.C.4 Immiscible Layers

Each well shall be tested for the presence of immiscible fluids prior to well evacuation and sample collection. The procedures for testing for immiscible fluid layers are as follows:

- a. Air in the wellhead will be screened for organic vapors using a photo ionization detector or other appropriate device.
- b. An electronic interface probe or other appropriate device capable of detecting light and dense immiscible fluids will be lowered into the well to determine the existence of any immiscible layers.
- c. If immiscible layers are detected, immiscible phases will be collected prior to any purging activities.

I.C.5 Well Purging

The volume of stagnant water in each well will be determined prior to well evacuation based on the static water level, well depth, well diameter, filter pack length, and borehole diameter. Three volumes of the pore space of the screen filter pack and three volumes of the well casing will be purged prior to sampling if possible.

- a. The volume of stagnant water to be purged shall be calculated according to the formulae presented in **Permit Attachment E, Appendix E-2** or the volume purged shall be sufficient when pH, temperature, and conductivity have stabilized. Purge volume calculations will be recorded in the Groundwater Log shown in **Permit Attachment E, Appendix E-1**.
- b. If the wells prove to be low yield, wells will be evacuated to dryness once and will be purged at a rate which will not cause recharge water to be excessively agitated. Dry and low recharge rates will be noted in the field observations.
- c. All purge water will be containerized and disposed of in an on-site wastewater treatment system if available or a permitted treatment facility with approval.

I.C.6 Micropurging Technique

When micropurging techniques are used, EPA guidance shall be followed (EPA/540/S-95/504). Dedicated bladder pumps shall be placed with their input at the midway point of

the screened interval. Flow rates should be low enough to minimize drawdown to the system. Water quality indicator parameters are used to determine purging needs. In-line flow cells are used to continuously monitor pH, specific conductance, temperature, etc. Purging is considered complete when indicator parameters have stabilized. Water levels and pumping rates will be monitored and recorded in addition to any adjustments.

I.C.7 Stabilization Parameters

Stabilization parameters pH, temperature, conductivity, and turbidity will be measured at the start and end of sampling as a check on the stability of the water samples over time. Four (4) replicate measurements of pH and specific conductivity will be recorded in the Groundwater Log shown in **Permit Attachment E, Attachment E-1** for each groundwater sample. In addition to the start and end measurements, additional measurements will be taken for each well volume. All purging equipment that has been or will be in contact with ground water should be decontaminated prior to use (see **Permit Attachment E, Section I.E**). Decontamination water should be stored in appropriate containers and disposed of per **Permit Attachment E, Section I.E**.

I.D **Groundwater Sampling Equipment**

The Department prefers that all sampling equipment be dedicated to a particular well. The following recommendations apply to the selection of sampling equipment:

- a. Sampling equipment should be chosen based on the analytes of interest and the characteristics and depth of the saturated zone from which the sample is withdrawn. For example, the choice of sampling equipment should reflect consideration of the potential for LNAPLs and DNAPLs.
- b. Sampling equipment should be constructed of inert material. Sample collection equipment should not alter analyte concentrations, cause loss of analytes via sorption, or cause gain of analytes via desorption, degradation, or corrosion.
- c. Sampling equipment should be designed such that Viton®, Tygon®, silicone, or neoprene components do not come into contact with the groundwater sample.
- d. Sampling equipment should cause minimal sample agitation and should be selected to reduce/eliminate sample contact with the atmosphere during sample transfer. Sampling equipment should not allow volatilization or aeration of samples to the extent that analyte concentrations are altered.

I.E **Decontamination**

When dedicated equipment is not used for sampling (or well purging) or when dedicated equipment is stored outside of the well, it will be thoroughly decontaminated between wells by disassembling and washing with (non-phosphate) detergent, thoroughly rinsed with de-ionized water, and air dried. All equipment coming in contact with media suspected of being contaminated will be decontaminated before it contacts a media which is likely to be less contaminated or uncontaminated.

I.E.1 Non-Dedicated Groundwater Sampling Equipment

All non-dedicated groundwater sampling equipment will be cleaned over a decontamination pad after each use in the following manner:

- a. Rinse with tap water.
- b. Wash with a non-phosphate laboratory detergent and tap water.

- c. Rinse with distilled water.
- d. Wash with laboratory-grade methanol or isopropanol.
- e. Triple-rinse with de-ionized, distilled water.
- f. Allow to air dry.

I.E.2 Equipment Storage

If the equipment is not to be used again immediately, it should be packaged and properly stored to protect it from dust and dirt. Equipment may be wrapped in aluminum foil (shiny side on the outside) and placed in a plastic bag. A label should be affixed to the outside wrapping summarizing the decontamination procedure and stating the date of decontamination. Decontaminated sampling equipment should not be placed on the ground or on other contaminated surfaces prior to insertion in the well.

I.E.3 Decontamination Pad

The decontamination pad will be lined with polyethylene sheeting and sloped to promote drainage towards one corner into an in-ground container. This will facilitate removal of any potentially contaminated decontamination fluids. The fluids will be collected, contained, labeled, and stored in U.S. Department of Transportation (DOT)-approved 55 gal drums. All decontamination fluids will be managed and disposed of in accordance with the Department Investigation-Derived Waste Policy. Disposable items will be disposed of as solid waste in an approved, permitted landfill.

I.F Groundwater Sample Collection

Monitoring well sampling should always progress from the well that is the least contaminated to the well that is the most contaminated, based on results from the most recent sampling event, to minimize the potential for cross-contamination of samples that may result from inadequate decontamination of sampling equipment. Samples should be collected and containerized according to the volatility of the target analytes. The preferred collection order for some of the more common groundwater analytes is as follows:

- a. Volatile organics and total organic halogens
- b. Dissolved gases and total organic carbon
- c. Semi-volatile organics
- d. Pesticides/herbicides
- e. PCBs
- f. Metals and cyanide
- g. Total phenols
- h. Major water quality cations and anions (sulfate, chloride, etc.)
- i. Nitrate

I.F.2 Sample Preparation and Handling

A sample collecting bottle kit should be prepared from the sample parameter list in accordance with approved sample analysis methods (see **Permit Attachment E, Appendix E-4**). The sample kit should be stored in clean coolers for transport to the site. To preserve sample integrity, all samples should be collected in pre-cleaned containers, preserved when required, and stored at the appropriate temperature. The containers shall be shipped with caps that are securely fastened. Samples shall be transferred directly from the sampling device to the sample containers.

I.F.3 Use and Operation of Groundwater Sampling

The following recommendations apply to the use and operation of groundwater sampling equipment:

- a. Check valves should be designed and inspected to ensure that fouling problems do not reduce delivery capabilities or result in aeration of samples.
- b. Sampling equipment should never be dropped into the well, as this will cause degassing of the water upon impact.
- c. Contents of the sampling device should be transferred to sample containers in a controlled manner that will minimize sample agitation and aeration.
- d. Decontaminated sampling equipment should not be allowed to come into contact with the ground or other contaminated surfaces prior to insertion into the well.
- e. Groundwater samples should be collected as soon as possible after the well is purged. Water that has remained in the well casing for more than about 2 hours has had the opportunity to exchange gases with the atmosphere and to interact with the well casing material.
- f. The rate at which a well is sampled should not exceed the rate at which the well was purged. Low sampling rates, approximately 0.1 L/min, are suggested. Pumps should be operated at rates less than 0.1 L/min when collecting samples for volatile organics analysis.
- g. Pump lines should be cleared at a rate of 0.1 L/min or less before collecting samples for volatiles analysis so that the samples collected will not be from the period of time when the pump was operating more rapidly.
- h. Pumps should be operated in a continuous, non-pulsating manner so that they do not produce samples that are aerated in the return tube or upon discharge.
- i. When sampling wells that contain LNAPLs, a stilling tube should be inserted in the well. Groundwater samples should be collected from the screened interval of the well below the base of the tube.
- j. Groundwater samples collected for analysis for organic constituents or parameters should not be filtered in the field.
- k. Sample collection must be accomplished prior to a flow-through cell, and subsequent to stabilization of indicator field parameters.

I.G **FIELD AND LABORATORY QA/QC PROGRAM**

Field Quality Assurance/Quality Control (QA/QC) requires the routine collection and analysis of blanks to verify that the sample collection and handling process has not affected the quality of the samples. Both field and laboratory QC samples should be prepared during the sampling event. It is recommended that the following samples be analyzed with each batch of samples (a batch may not exceed 20 samples):

- a. One field duplicate
- b. One equipment rinsate (required only when non-disposable equipment is being used)
- c. One matrix spike (when appropriate for the method)
- d. One duplicate sample (either a matrix duplicate or a matrix spike duplicate)

- e. A trip blank should be prepared and analyzed when samples are being analyzed for volatile organic analytes. A trip blank should be submitted with samples each day that samples are collected.

I.G.2 QC Samples

All field QC samples should be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The concentrations of any contaminants found in blank samples should not be used to correct the groundwater data. The contaminant concentrations in blanks should be documented, and if the concentrations are more than an order of magnitude greater than the field sample results, the Permittee should resample the ground water. Other QA/QC practices such as sampling equipment calibration, equipment decontamination procedures, and chain-of-custody procedures are discussed in other sections of this Permit Attachment E.

I.G.3 Laboratory QA/QC Program

The permittee's laboratory should provide for the use of control samples. The Permittee should use appropriate statistical procedures to monitor and document performance and to implement an effective program to resolve testing problems (e.g., instrument maintenance, operator training). Data from control samples (e.g., spiked samples, duplicates, and blanks) should be used as a measure of performance or as an indicator of potential sources of cross-contamination. All QC data should be submitted to the Department with the groundwater monitoring sample results.

I.G.4 Instruments

At a minimum, all field instruments should be calibrated at the beginning of each use and in accordance with the frequency suggested by the manufacturer. Field instruments should be calibrated using at least two calibration standards spanning the range of results anticipated during the sampling event. For example, if groundwater pH is expected to be near pH 7, the two standards used to calibrate the pH meter should be pH 4 and pH 10, respectively.

I.H SAMPLE HANDLING AND CHAIN-OF-CUSTODY

Sample handling will be strictly controlled to prevent sample contamination. Chain-of-Custody control for all samples will consist of the following:

- a. Labels will be placed on individual sample containers while sampling indicating the sampler's name, date and time of sample collection, place of collection, and preservation method used for the sample.
- b. A custody seal should be placed on the shipping container or on the individual sample bottles. Custody seals provide prevention or easy detection of sample tampering. The custody seal should bear the signature of the collector and the date signed. The custody seal can be placed on the front and back of a cooler, around the opening of a polyethylene over-pack bag or on the lid of each sample container.
- c. No sample should be brought back to the laboratory for preservation. It is recommended that two polyethylene over-pack bags be used in shipping. The first will contain the sample bottles, the second the ice needed to keep the samples at 4°C. A temperature history of the sample should be maintained as a quality control measure. Upon receipt of the shipment, the laboratory should record the

temperature on the chain-of-custody record. Holding time refers to the period that begins when the sample is collected from the well and ends with its extraction or analysis.

- d. A chain-of-custody record should be completed and should accompany every sample shipment. The chain-of-custody record should contain enough copies so that each person possessing the shipment receives his/her own and should be designed to allow the Permittee to reconstruct how and under what circumstances a sample was collected, including any problems encountered. An example of a chain-of-custody form that includes the necessary information is included as **Permit Attachment E, Appendix E-3**.
- e. Samples will be packaged and labeled for shipment in compliance with current U.S. Department of Transportation regulations. All samples will be shipped priority/overnight via commercial carrier or hand delivered to the lab.
- f. Samples will arrive at the laboratory via the overnight delivery service or hand delivery. Upon delivery to the laboratory, the ice chests will be checked for intact custody seals and the samples will be unpacked and the information on the accompanying chain of custody records will be examined. If the samples shipped match those described on the chain-of-custody form, the laboratory sample coordinator will sign the form and assume responsibility for the samples. If problems are found with the sample shipment, the laboratory sample custodian will sign the form and record the problems in the "Remarks" section.
- g. Any missing samples, missing sample tags, broken sample bottles, or unpreserved samples will be noted on the chain-of-custody record. If there are problems with individual samples, the sample custodian will inform the laboratory coordinator of such problems. The laboratory custodian will then contact the Permittee to determine a viable solution to the problem.
- h. All information relevant to the sample will be secured at the end of each business day. All samples will be stored in a designated sample storage refrigerator, access to which will be limited to laboratory employees.

I.H.2 Field Logbook

Field technicians will keep up-to-date field logbook documenting information pertaining to field activities. **Permit Attachment E, Appendix E-1**, provides an example of a Groundwater Log that includes the minimum information that must be completed for each monitoring well sampled.

II. LABORATORY ANALYSIS

II.A INTRODUCTION

The groundwater parameters and constituents to be analyzed include organic and inorganic constituents which have been used at the facility or have been detected in the facility's waste, sludge, and/or groundwater are listed in **Permit Attachment F**, as well as the analytical methods that must be used in the analysis of groundwater samples.

II.B LABORATORY QA/QC

QA/QC procedures will be used at all times. The laboratory shall assure the accuracy and precision of all analytical determinations.

II.B.1 Internal Quality Control

Internal quality control checks shall be undertaken regularly to assess the precision and accuracy of analytical procedures. Internal quality control checks shall include use of calibration standards, standard references, duplicates, and spiked/fortified samples.

II.B.2 Calibration

Calibration standards shall be verified against standard reference from an outside source. Calibration curves shall be comprised of a minimum of one blank and three standards. Samples shall be diluted if necessary to ensure analytical measurements fall on the linear portion of the calibration curve.

II.B.3 Duplicate Samples

Duplicate samples shall be processed at an average frequency of ten percent to assess the precision of testing methods, and standard references shall be processed monthly to assess accuracy of analytical procedures. Spiked/fortified samples shall be carried through all stages of sample preparation and measurement to validate the accuracy of analysis. During the course of analysis, quality control data and sample data shall be reviewed to identify questionable data.

III. **DATA EVALUATION**

III.A **Analytical Data Review**

The Permittee and/or its representative will review and validate the analytical data to ensure that the laboratory followed proper analytical protocols. The data review will be performed in general accordance with the following United States EPA guidance documents:

- a. Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses, April 1993
- b. Region III Modifications to National Functional Guidelines for Organic Data Review Multi-Media, Multi-Concentration, September 1994

III.B **Statistical Evaluation**

In the event that a constituent concentration exceeds the groundwater protection standard (GPS) for the individual constituent, statistical evaluation of the analytical data will be performed in accordance with 40 CFR § 264.97 using a tolerance or prediction interval procedure. In the event that no constituents exceed their respective GPS, no statistical evaluation will be performed. Statistical evaluations will be performed in general accordance with Permit **Attachment E, Appendix E-6**.

III.C **Data Quality Objective**

High-quality data collection implies data of sufficient accuracy, precision, and completeness (i.e., ratio of valid analytical results to the minimum sample number called for in the Permit) to meet the program objectives.

- a. It is the Permittee's responsibility to report sufficient valid analytical results for each annual event
- b. Reported data will, at a minimum, be of such quality to immediately detect a release from the regulated unit.

- c. Laboratory methods will be selected to yield reporting limits (limit of quantitation, or LOQ) values that are equal to or below human health-based standards for the target analytes.
- d. The human health-based standards are established as Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act, or as Alternate Concentration Limits (ACLs) whenever MCLs are not available.
- e. ACLs were originally calculated by the Risk Exposure and Analysis Modeling System (REAMS) using a residential ground water ingestion-modeling scenario. The GPS for each constituent will be updated with current data and are listed in **Permit Attachment F**.

IV. RECORDKEEPING AND REPORTING

IV.A Introduction

Copies of all groundwater analytical results, groundwater annual reports, groundwater level elevations, Groundwater Sampling and Analysis Plan, Post-Closure Care Permit, etc. shall be maintained at the Winchester site throughout the active life of the facility and post-closure care period. The Permittee shall report the groundwater monitoring information to the Director described in **Permit Attachment E, Sections VII.B and VII.C**.

IV.B Groundwater Monitoring Results

The Permittee shall report concentrations or values of the parameters and constituents listed in **Permit Attachment F** for each required groundwater monitoring well within 30 days after completing each analysis.

IV.C Annual Report

The Permittee shall submit an Annual Groundwater Monitoring Report to the Virginia Department of Environmental Quality by March 1st of the following year for the year beginning January 1 and ending December 31 containing:

- a. Static groundwater level elevations
- b. Potentiometric surface maps reflecting each sampling event
- c. Groundwater flow rate and direction in the uppermost aquifer calculated after each sampling event
- d. Statistical evaluations of the concentrations or values of the parameters and constituents listed in **Permit Attachment F** to the Groundwater Protection Standard listed in **Permit Attachment F**
- e. The calculated or measured rate of migration of hazardous waste or hazardous waste constituents in the groundwater
- f. Results of the evaluations of groundwater surface evaluations to determine whether the requirements for locating the monitoring wells continue to meet the criteria set forth in 40 CFR § 264.97.

Appendix E-1

Groundwater Log Example

Sampling event _____

Location _____

Well no. _____ Date: _____

Weather _____ Temperature: _____

Measurement team _____

Time well casing unlocked _____

Depth to water from top of outer casing _____ ft.

Depth of well from top outer casing _____ ft.

Static water level _____ ft.

Measurement technique: Water level indicator
 Other/explain _____

Formulas for determining purge volume TWD =

Water level above sand pack:

$$3 \times [(\pi r_b^2 h_s - \pi r_c^2 h_s) \times 0.3 + (\pi r_c^2 h_w)]$$

Water Level below sand pack:

$$3 \times [\pi r_b^2 h_w - \pi r_c^2 h_w] \times 0.3 + (\pi r_c^2 h_w)]$$

Where:

r_b = radius of boring =

r_c = radius of casing =

h_s = height of sand =

h_w = height of water =

Immiscible layers: yes no

Detection method: visual other _____

Collection method: beaker other _____

Sample identification _____

Purge team _____

Purge procedure/equipment: Teflon bailer

Well pump

Purge time _____ Purge volume _____

Purge appearance _____

Comments _____

Sampling event: _____

Location _____

Well: _____ Date _____

Sampling procedure/equipment: Teflon bailer

Well pump

Sampling time: _____

pH Meter calibrated with buffers: 4 7 10

pH Meter calibrated by: _____

Conductivity meter calibrated with standard solution of _____

Conductivity meter calibrated by: _____

pH (S.U.) _____

Temp (°C) _____

Cond (µS) _____

Sample Collection Time: Container*/Preservative

(1) _____ VOC(G/none)

(9) _____ SO(/)

(2) _____ TOX(A/HNO₃)

(10) _____ TMET(P/HNO₃)

(3) _____ TOC(A/H₂SO₄)

(11) _____ DMET(P/NONE)

(4) _____ COD(A/H₂SO₄)

(12) _____ pH, COND(P/NONE)

(5) _____ O&G/TPH(A/HCL)

(13) _____ Chloride(P/NONE)

(6) _____ PHEN(A/H₂SO₄)

(14) _____ SMLL TST(P/NONE)

(7) _____ N(/)

(15) _____ CN (P/NONE)

(8) _____ PHOS(A/H₂SO₂)

(16) _____ (P/NONE)

Final pH (S.U.) _____ Final temperature (°C) _____

Final conductivity (µS) _____

Locked well at

Comments

Notes:

1. G = glass, A=amber glass bottle , P=plastic (polyethylene)
2. Shipping containers (cooling chest with ice or ice pack) should be certified as to the 4°C temperature at time of sample placement into these containers. Preservation of samples requires that the temperature of collected samples be adjusted to the 4°C immediately after collection. Shipping coolers must be at 4°C and maintained at 4°C upon placement of sample and during shipment. Chain-of-custody forms will have Shipping/Receiving (max/min) temperature boxes for recording data and verification.
3. IDW: Collect all used decontamination solutions and rinses; store in a labeled 55 gallon drum for no more than 90 days in accordance with the Department's IDW Policy.
4. Siltation: If the level of siltation is higher than 1 foot above the base of the screen, the well will need to be redeveloped. Note whether the level of siltation is greater than 1 foot in the comments section.
5. Dedicated Teflon Tubing: replace if older than one year; note in comments the date the tubing was installed.

Appendix E-2:

Calculations of Purge Volume

Determine purge volume as follows:

Water level above sand pack:

$$3 \times [(\pi r_b^2 h_s - \pi r_c^2 h_s) \times 0.3 + (\pi r_c^2 h_w)]$$

Water level below sand pack:

$$3 \times [(\pi r_b^2 h_w - \pi r_c^2 h_w) \times 0.3 + (\pi r_c^2 h_w)]$$

Where:

r_b = radius of boring

r_c = radius of casing

h_s = height of sand

h_w = height of water

This calculation must be based upon 30% filter pack volume. Once the volume to be purged is known, purging can begin. The purge water will be collected, containerized disposed of in accordance with local, state, and federal regulations and laws.

Appendix E-4:

Sample Containers and Preservatives

Table E-1: Analytes Sample Containers and Preservatives

Analyte	SW-846 Analysis Numbers	Container	Preservative	Holding Time(days)
Metals except mercury	6010B, 6020A	HDPE	HNO ₃ to pH<2	6 months
Mercury	7470A	HDPE	HNO ₃ to pH<2	28
Appendix IX VOCs	8260B	40 ml VOA	4°C	14
Appendix IX Semi-volatiles	8270C	Amber glass	4°C	7/40
Appendix IX Organochlorines	8081A	Amber glass	4°C	7/40
Appendix IX Herbicides	8151A	Amber glass	4°C	7/40
Appendix IX Organophosphates	8141	Amber glass	4°C	7/40
Hexachlorophene	8151A	Amber glass	4°C	7/40
pH	9040	HDPE	None	Analyze immediately
Specific Conductance	9050	HDPE or glass	4°C	Analyze immediately

Notes:

1. References:

- Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, SW-846* (3rd edition, 1996 as updated).
- Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020.*
- Standard Methods for the Examination of Water and Wastewater*, 16th edition (1985).

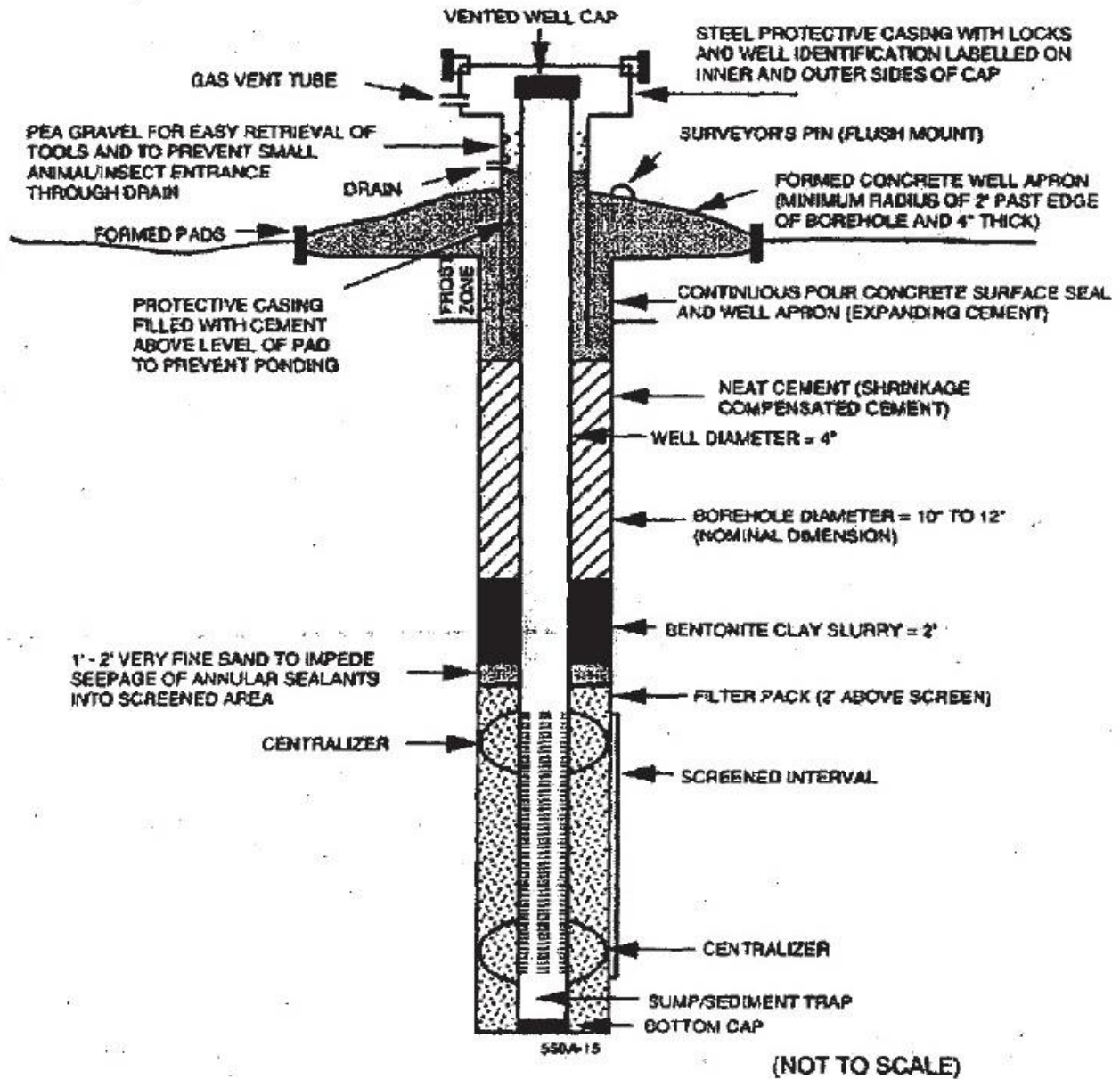
2. Container Types:

- HDPE = Plastic (polyethylene)
- T = Fluorocarbon resins (PTFE, Teflon, FEP, PFA, etc.)

Appendix E-5:

Monitoring Well Construction Diagram

(Source: EPA Technical Enforcement Guidance Document, 1986)



CROSS-SECTION OF TYPICAL MONITORING WELL

Appendix E-6:

Statistical Procedures

I. HIGHLIGHTS

In accordance with 40 CFR § 264.97(g), the Permittee will collect an appropriate number of samples from up-gradient well(s) and an appropriate number of samples from each of the point of compliance wells specified in **Permit Condition V.C**. Appropriate background sample sizes for the preferred method of statistical analysis will be collected prior to the scheduled date of the statistical analysis.

I.A Statistical Analysis Of The Groundwater Data Will Include The Following:

- a. Outliers
- b. Testing of normality
- c. Missing data
- d. Evaluation of data below detection limits or quantitation limits
- e. Selection of statistical method
- f. Verification sampling strategy (optional)
- g. Comparison of point of compliance well data to the Groundwater Protection Standard (GPS) specified in **Permit Attachment F**.

I.A.2 Outliers

An outlier refers to a data point which is an inconsistently large or small value. An outlier can be observed due to sampling, laboratory, transportation, or transcription errors. To remove the possibility of including data with this type of error, the historical data should be screened for each well and constituent for the existence of outliers (USEPA 1992 Section 6.2) using the method described by Dixon (1953) or another method approved by the Department. Background observations, which are considered to be outliers, should not be included in the statistical analysis. If an extreme value occurs in a point-of-compliance well or during a compliance sampling event, the facility should collect a re-sample during the compliance period of the initial sample. Any elimination of an outlier must be approved by the Department.

I.A.3 Testing Normality of Data Distribution

The Permittee shall verify that the distribution of monitoring data for the Hazardous Constituents is consistent with the assumptions of the selected statistical test method. A multiple group version of the Shapiro-Wilk test shall be applied to determine if the distribution of the data is normal or lognormal. To test for log normality, the natural logarithms of original data are taken and if the distribution of the transformed concentrations is normal then the data are considered to be log-normally distributed. The Permittee may use any other appropriate method for testing the distributional assumptions (see Gibbons 1994a for a review, also see USEPA 1992). However, the Permittee shall demonstrate that the alternative method can detect deviations from normality with similar power as the Shapiro-Wilk and Shapiro-Francia methods. No testing of normality is required when the percentage of non-detects or non-quantified values are greater than 50%.

Once the distribution of the data is determined, the Permittee should apply statistical tests as follows:

- a. When the detection frequency is less than 50% and/or transformation fails to bring about normality, a non-parametric method should be used.
- b. When the detection frequency is between 50% and 75%, a parametric test can be performed with an adjustment for non-detects. Aitchison's or Cohen's adjustments are recommended. Determination of the appropriate adjustment to be applied should be based on the properties of the data set (USEPA, 1992, Section 2.2).
- c. When the detection frequency is 75% or greater, an appropriate parametric test may be applied without adjusting for non-detects. Non-detects should be analyzed using one half the laboratory limit of detection or quantitation.

I.A.4 Missing Data

If a sampling event results in a missing data value, an attempt to resample for the missing value shall be made within two weeks.

I.A.5 Data below Detection Limits

For data where the non-detects or non-quantified values are less than 25 percent, the Permittee shall replace the non-detects or non-quantified values with one half the laboratory limit of detection or quantitation. However, when the percentage of non-detects or non-quantified values is greater than 25 percent and less than 50 percent the mean and standard deviation should be adjusted using Aitchison's method (USEPA 1992 Section 2.2.2 and Aitchison, 1955). An acceptable alternative to Aitchison's method is Cohen's maximum likelihood estimator (Cohen, 1961). Extensive tables and computational details are also provided in Gibbons, 1994a. The approach for selection between the two methods is described in USEPA (1992) Section 2.2.1.

I.B Selection of Statistical Method

The Permittee shall use an appropriate statistical method consistent with the Virginia Hazardous Waste Management Regulations. As specified in these regulations, the level of significance for individual well comparison shall be no less than 0.01 and no less than 0.05 for multiple comparisons. However, these performance standards do not apply for prediction intervals, tolerance intervals and control charts. The false positive rate for these interval methods or control charts can depend on the number of data points available from the background wells at the time of statistical comparison. A larger number of background data points can decrease the false positive rate for these tests. In the event the Permittee has decided to use an interval or other statistical method, and if the selected method requires additional samples, the Permittee shall collect the additional samples prior to the date specified in this Permit for conducting appropriate statistical analysis. The statistical comparison shall not be delayed due to collection of an inadequate number of samples. The false-positive rate for a single constituent/well comparison shall not be lower than .01 unless the Permittee can demonstrate that an alternative false positive rate will provide at least 50% power to detect a 3 standard deviation increase above background levels and 80% power to detect a 4 standard deviation increase above background levels.

I.B.1 Interval Method

If the Permittee uses an interval method and the percentage of detects is greater than 50%, the Permittee shall test the data from the background wells for normality. If the background well data are normally or log-normally distributed the Permittee shall use a parametric interval method. Table E-1 provides the suggested minimum number of samples for calculation of parametric interval methods that are acceptable to the Department. In the event the background data are not normally or log-normally distributed the Permittee shall use a non-parametric interval method. Suggested test methods and recommended minimum sample size requirements are provided in Table E-1. However, a statistical analysis can be conducted with a smaller data set than the suggested size at any time. Please note that these methods can lead to higher false positive or false negative rates with smaller samples sizes. For each sampling event, the Permittee shall calculate the appropriate interval for the background data set based on the method selected, and compare each data point from the point of compliance well to the upper limit. If the point of compliance well data exceeds the upper limit, the Permittee shall report that there has been a statistical increase of contaminants in the groundwater.

I.B.2 Other Methods

In the event the Permittee has selected any other method listed in the Virginia Hazardous Waste Management Regulations, the Permittee shall collect the appropriate number of samples and shall maintain the appropriate level of significance specified above.

I.C Verification Sampling (Optional)

Verification resampling can be an integral part of the statistical methodology (USEPA, 1992 section 5); however, it should be considered as a part of the statistical test and based on the site-specific condition. Since the probability of an initial exceedance is very high for the site as a whole (considering only test wise false positive rates), the verification sample is considered as a part of the evaluation to conclude a statistically significant exceedance. A pre-planned verification sample can be incorporated into the calculation of the statistical limits to calculate an upper limit using a smaller false positive rate.

Without verification resampling, an attempt to minimize the false positive rates will lead to very large prediction limits. This will increase the false negative rates and decrease the power of the test to detect a release from the facility. All verification samples must be collected at the earliest time possible (prior to next scheduled sampling event) or as approved by the Department or as specified in this Permit. Note that the Department must be informed of any planned verification resampling in advance.

Verification resampling can involve one or two samples. The Department's preferred strategy includes passing one verification resample or passing one of two verification resamples. Statistical analyses which incorporate verification samples must provide at least 50% power to detect a 3 standard deviation increase above background levels and 80% power to detect a 4 standard deviation increase above background levels.

I.D Comparing Point of Compliance Well Data to a Standard during Compliance or Corrective Action Monitoring

In accordance with the Virginia Hazardous Waste Management Regulations, the point-of-compliance data shall be compared to the GPS. If a maximum contaminant level (MCL) is promulgated or alternate concentration limit (ACL) is established for a constituent, and the ACL or MCL is greater than the background limit (or statistically determined background

level), the ACL or MCL is the groundwater protection standard. All new concentrations in the point of compliance wells should be compared to the standard (i.e., ACL or MCL) using the lower 95% confidence limit computed from the last four sampling values (collected during the last 12 months).

If an upper limit based on a tolerance or prediction limit calculated from naturally occurring background data exceeds the MCL or ACL, then the background limit will be the groundwater protection standard. If the groundwater protection standard is based on a tolerance or prediction limit, the point of compliance samples shall be compared to the GPS using a point comparison. If the point of compliance sample exceeds the background based GPS, a statistical exceedance above the GPS shall be reported to the Department.

However, for all constituents analyzed, if the established groundwater protection standard is less than the Department-accepted Limit of Quantitation (LOQ) then the LOQ becomes the standard, and the new point of compliance well data will be compared to the LOQ.

Comparisons of point of compliance well data to a groundwater protection standard based on a MCL or ACL should be performed by a parametric or non-parametric confidence interval. If data are normally or log-normally distributed a 95% lower confidence limit on the last four samples (collected during the last 12 months) can be calculated for comparison to the MCL or ACL. If data are not normally or log-normally distributed the minimum concentration from the last four samples (collected during the last 12 months) should be compared to the groundwater protection standard (based on a MCL or ACL).

Alternative statistical methods for comparing lower limits of compliance well data to a groundwater protection standard based on a MCL or ACL should be approved by the Department prior to implementation. If the lower confidence limit or minimum concentration exceeds the groundwater protection standard based on a MCL or ACL then the Permittee has shown a statistical exceedance above the ground water protection standard.

Please note that a point comparison (non-statistical) to the GPS (based on a MCL or ACL) may be performed if only one data point exists for a sampling event. If the point comparison indicates that the given data point is above the groundwater protection standard, and the GPS is based on a MCL or ACL, and the facility chooses not to use data from the previous three sampling events, then additional samples (at least three additional samples will be required to calculate a confidence interval) may be collected within the next 3 months and a statistical comparison to the GPS (based on a MCL or ACL) may be performed.

II. REFERENCES

- Aitchison, J. On the distribution of a positive random variable having discrete probability mass at the origin, *Journal of American Statistical Association*, 50(272), 901-908 (1955).
- Cohen, A.C. Tables for maximum likelihood estimates: Singly truncated and singly censored samples, *Technometrics*, 3, 535-541 (1961).
- Gibbons, R.D. *Statistical Methods for Groundwater Monitoring*, John Wiley and Sons, Inc., 1994.
- Gibbons, R.D. Some conceptual and statistical issues in analysis of groundwater monitoring data, *Environmetrics*, 7, 185-199 (1996).

USEPA, Statistical analysis of groundwater monitoring data at RCRA facilities. Addendum to Interim Final Guidance. Office of Solid Waste, July 1992.
USEPA, Statistical analysis of groundwater monitoring data at RCRA facilities - Interim Final guidance (April 1989).

Table E-2: Suggested Minimum Samples

Reference	Parametric	Non-Parametric	Non-Parametric Interval %Confidence
CABF T-test	4	NA	NA
Wilcoxon Rank Sum	NA	5	NA
Confidence Interval	4	NA	NA
Tolerance Interval	8	19	95%
Prediction Interval	8	13	99% [#]
Shewhart CUSUM Chart ⁺	8	NA	NA

The above tests can be used with fewer samples; however it will increase the false positive rate.

[#] Includes one verification re-sample, use 19 samples for a 95% Prediction Interval with no verification re-samples.

⁺ For Intra-well testing only

NA = Not Applicable

Appendix E-7:

Monitoring Well Abandonment Procedures

Note: Approval from the Director must be granted before any monitoring well may be abandoned.

Well Abandoned

Monitoring wells and/or piezometers will be abandoned by pressure grouting methods. Surface installations (protective covers or manholes) will be removed and an attempt to pull the casing string with the rig will be made.

Once this has either been accomplished or has failed, grouting operations will commence as described below.

- a. Monitoring well abandonment will be accomplished by lowering a tremie pipe to the bottom of the borehole.
- b. Portland cement/bentonite grout will then be pumped down the tremie pipe until an even flow of consistent grout returns at the surface.
- c. The tremie pipe will be removed from the borehole on completion of grouting operations and a minimum four inch thick and six foot diameter concrete cap will be constructed over the grouted borehole.

Casings Removal

Removed casings will be steam cleaned, cut up into manageable sections, and disposed of as refuse.

Tremie Rods

All tremie rods and other downhole equipment will be steam cleaned prior to introduction into the hole or well.

Decontamination Fluid

All decontamination fluid will be containerized and handled pursuant to decontamination fluid handling procedures contained in **Permit Attachment E, Section I.C.**

ATTACHMENT F
*GROUNDWATER ANNUAL MONITORING CONSTITUENTS AND
FREQUENCIES*

ATTACHMENT F

GROUNDWATER ANNUAL MONITORING CONSTITUENTS

Table F-1: Groundwater Monitoring List

Constituents	SW-846 Analytical Method	Origin	GPS (µg/l)
Arsenic	6010B,6020A	MCL	10
Barium	6010B,6020A	MCL	2,000
Cadmium	601 0B,6020A	MCL	5
Chromium	6010B,6020A	MCL	100
Cobalt	6010B,6020A	ACL	313
Lead	6010B,6020A	MCL	15
Mercury	7470A	MCL	2
Selenium	60108,6020A	MCL	50
Silver	60I 08,6020A	ACL	78
Carbon tetrachloride	8260B	MCL	5
Chloroform	8260B	MCL	80
Chloromethane	8260B	ACL	190
1,2-Dichlorobenzene	8260B	MCL	600
1,1-Dichloroethane	8260B	ACL	2.7
1,1-Dichloroethene	8260B	MCL	7
Trichloroethene (TCE)	8260B	MCL	5
cis-1,2-Dichloroethene (cis-12DCE)	8260B	MCL	70
trans-1,2-Dichloroethene (trans-12DCE)	8260B	MCL	100
Vinyl Chloride(VC)	8260B	MCL	2
1,2-Dichloropropane	8260B	MCL	5
Methylene chloride	8260B	MCL	5
Tetrachloroethene	8260B	MCL	5
1,1,1-Trichloroethane	8260B	MCL	200
1,1,2-Trichloroethane	8260B	MCL	5
1,1,2-Trichloro-1,2,2-trifluoroethane	8260B	Tap Water RSL	10,000

Notes:

Alternate SW-846 Methods may be approved by the Department if the request is in writing and submitted at least 30 days prior to the sample collection event. Proposed alternative methods must achieve the appropriate Data Quality Objective (i.e., at least a Department approved health-based concentration limit).

All methods are as described in EPA's SW-846, Test Methods for Evaluating Solid Waste, Third Edition.

Groundwater protection standard concentration limits based on:

Maximum Contaminant Levels (MCLs derived from EPA's Drinking Water Regulations and Health Advisories)

Alternate Concentration Limits (ACLs derived from Virginia Department of Environmental Quality ACL table updated December, 2014 with 10⁻⁶ cancer risk and HQ, or If MCL or ACL are not available, the EPA Region III Tap Water RSL

ATTACHMENT G
CORRECTIVE ACTION REMEDIAL TARGETS

ATTACHMENT G

Corrective Action Remedial Targets

Table G-1: Corrective Action Remedial Targets

Constituent	Remedial Goal (ug/L)	Basis
Trichloroethene (TCE)	5	EPA Drinking Water MCL
cis-1,2-Dichloroethene (cis-1,2-DCE)	70	EPA Drinking Water MCL
trans-1,2-Dichloroethene (trans-1,2-DCE)	100	EPA Drinking Water MCL
Vinyl Chloride (VC)	2	EPA Drinking Water MCL

ug/L = micrograms per Liter